

POINTS AND DOCKS

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16. 01. 84.

26. JUN. 1987

05. FEB 87.

30. 01. 84. 02. FEB 89

17. MAY 84.

22. JUN. 1990

27. NOV 84.

04. FEB 91

22. APR 85.

30. OCT 86.



PORTS AND DOCKS



THE NEW BERMUDA FLOATING DOCK :
H.M.S. SANS-PAREIL TESTING IT

PORTS AND DOCKS

THEIR HISTORY, WORKING, AND
NATIONAL IMPORTANCE

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DOUGLAS OWEN

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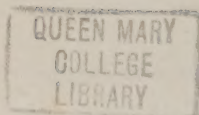
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PORTS AND DOCKS

CHAPTER I

INTRODUCTORY AND HISTORICAL

WHEN the big waves come dashing upon our island shores, and the fierce gale carries high over the swelling downs the ocean's briny spray, the pedestrian far inland will oftentimes declare, and declare with truth, that he 'tastes the salt.' Still more, both in our daily talk and in the pages that we read may we 'taste the salt' of the sea which for centuries has been for us islanders the scene of our adventures and of our trade, and of many a gallant fight which has brought us an undying fame. For our language is impregnated with the salt of the sea, and with the slang of the ship. And though many of such expressions are now used in forgetfulness of their nautical origin, there still remain plenty which need no interpreter,

even though altered conditions may have robbed them of much of their original force and truth.

‘Any port in a storm,’ for example, was, in the case of the ships of ancient times, a proposition of the widest application; for to the sailormen of those days a port meant shelter and supplies, and where there was shelter there doubtless would be depth enough. But this is long ago. For as the size and draught of ships increased, so the ports, shallow in themselves, or shallow in their approach, ceased to appeal to the larger vessels; either for storm or calm their day had passed. Nor was it, in those days, within the power of the port to avert its fate. To some small extent, no doubt, this could be deferred by resort to such primitive dredging appliances as were then possible, and where the port lay up a river, still more could be done to maintain the navigable channel by embankment of its shores; but such processes are costly, and in many cases they were not attempted, or, if attempted, were ultimately abandoned.

But while the decadence or abandonment of many an ancient port may no doubt be thus accounted for, the struggling port has often fallen a victim to causes other than the development of shipping and its failure or inability to keep up with this development. For in like manner, for

example, as the coast-line is sometimes eaten into and swallowed by the encroaching waves, so in other cases has the sea receded and left high and dry the ports of former days. Then it may well be supposed that in former times, as is certainly the case to-day, competition was severe between port and port; and the port which neglected the development of its means of inland transport, its roads and waterways, would cease to appeal to shipping, and would be imperilled by a rival more enterprising.

For while it is no doubt true that the ships must come where the trade calls them—that it is, from our present point of view, the port which makes the shipping, and not the shipping which makes the port—so also is it true that it is the population which makes the port. The population may be either at the port, as in the case of London, or it may be behind the port, as in the case of Liverpool and Hull; but the population there must be. The port is the mouth through which a population is fed and supplied by the ships; so that a port which, having no large population of its own, neglects to keep up and develop its communications with the cities behind it, will see itself deserted by its shipping. To express it differently, ships come to the market which needs their cargoes, and this market the populations behind the port,

as well as the population of the port, combine to make.

It follows, therefore, that the ports which possess or have behind them the biggest populations will, the facilities of inland transit being equal, be themselves the biggest ports. But while it is always the population which makes the port, it must never be forgotten that it is possible for an inland population to have, by reason of its situation, a choice of markets—a choice of ports. In such cases the competition of the ports must be prolonged and keen, and the opening up of new means of transit between the centre of consumption and one of the ports may seriously affect the popularity and prosperity of the other.

Very early in our national history, or, indeed, earlier than our history is fully recorded, the Cinque Ports and, later, their two ‘antient cities,’ Rye and Winchelsea, were, next to London, the country’s principal ports. Kent was thickly studded with religious or ecclesiastical foundations in close relation and in constant touch with those across the Channel. This corner of England was from early times thickly populated. At the time of the Spanish Armada Kent is said to have provided double the men and horses supplied by any other county. It was a county

of boroughs, towns and hamlets, and of rich religious houses.

The Cinque Ports were in part trading ports for the population at their back, in part the country's watch-dogs against foreign marauders. The coast of Kent was in constant danger from across the Channel, whilst from the Cinque Ports there departed also many a fleet to raid the Low Country and the rich towns of Northern France. Later in their history, in return for privileges conferred upon them, they were always to hold certain shipping at the disposal of the Crown. And lying as they did on the highway to the Thames and to the Low Countries, they doubtless derived no small advantage as refuges to vessels passing through and wind-bound in the Downs.

Early in their history, however, they occupied a position very different from that of later days. For at one time ancient vessels sailed past Winchelsea and Rye inland over spacious fiords or inlets for many a mile, where the tidal waters lapped the foot of grassy hills. But gradually the sea retired, its inland bed becoming first tidal marsh, and then marshy plains with channels more or less navigable, but always of lessening reach and depth.

No doubt the trading craft themselves were

constructed to suit the altering conditions. In 1822, for example, there was dug out of one of the branches of the river Rother, near Tenterden, some half-score miles from the sea, an ancient vessel, flat-bottomed, about 63 feet long and 15 feet broad, with a depth of 9 feet from gunwale to keel, so far as she had any keel. As showing the growth of the land, the depth of soil from the grass to the vessel's keel—that is, to the former river-bed—was 19 feet. As little by little the sea withdrew and the flat land increased, the manorial and other proprietors no doubt seized on and strove to increase such a valuable addition to their landed possessions. And to-day long grass sways to the breeze, and flocks of fleecy sheep pass from mead to mead across resounding wooden bridges over narrow dykes which drain the water-meadows, where centuries ago old-fashioned ships rolled lazily at their anchors.

But, the Cinque Ports apart, in early days the best-known and most prosperous of our ports were river ports. The cathedral cities and the abbey towns were largely placed on, or not far removed from, the rivers' banks, where the ship or barge could do more cheaply and conveniently the work of the pack-horse, and where, too, the fisherman's craft could be relied on to supple-

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ment food-supplies, and to mitigate the austerities of Lenten abstinence. London, King's Lynn, Yarmouth, and Ipswich on the east coast; Southampton, Plymouth, and Dartmouth on the south; Bristol and Gloucester on the west, are good examples.

Nothing could compete with the river in cheapness and facilities of inland transport, and where the rivers themselves fell short artificial means were taken to increase the benefits of water-carriage. Thus in 1624 the Thames was made navigable so far as Oxford. Not long after, the construction of canals was set on foot in order to supply to cities less favourably placed the advantages enjoyed by towns on the riverside. About the middle of the eighteenth century there seems to have set in something like a national mania for canal-making, to the dismay of the packmen, who raised a cry that, in protection of their industry, no canal should come within four miles of any considerable town.

No doubt the pack-horse carriers, the waggoners, and the inn-keepers generally felt the pinch of the new competition, and the country towns dependent on road-carriage, with roads in their then condition, must have been stirred to a sense of their own disadvantages. However this may be,

*River**Canal*

Inland
we read that in the fourteen years from 1760 to 1773 there were passed 452 Acts for the construction or improvement of highways, the result being a vast expansion of traffic.

Meantime, construction of canals continued to progress, so that before many years the canal mileage probably exceeded 2,000, while that of the rivers and their navigable extensions was apparently of similar length.

canals
The wholesale excavation of canals brought with it an army of spade-men or 'inland navigators'; and 'navvies' they have remained ever since, though their brawn and sinew now go into railway-making; just in the same way, indeed, as the coach 'guard' with his blunderbuss carried his name, but not his scatter-gun, into the railway brake; and as the 'booking-office' for the coach gave its name to the railway ticket-office. And if we all knew as much as we would love of our own language, no doubt we should still find on the tow-path, and in the gaily-painted cabin of the *Susan Ann* more than one quaint term handed down from those still earlier inland navigators the packman and the waggoner.

To return, however, to our navigable canal system, it can hardly be doubted that by thus connecting inland towns and districts with this

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and that ocean port the prosperity of the latter,
thus made the market for new populations, was
considerably enhanced. At this point, however,
in the history of inland water-transit, its various
promoters found themselves faced with a new and
unlooked-for danger, the advent of the railways.
And slowly but surely the use of the waterways,
old and new, the latter constructed at so great
a cost, were put in the shade and superseded by
the iron road. Gradually the railway companies
either bought out or succeeded in cutting out
the carriers by water.

For though no carriage is so cheap as that by
water when the latter is a highway provided by
Nature, the construction of canals is a costly
undertaking, involving the collection of adequate
rates of carriage. Moreover, at best it is a slow
process. So that any advantage which the canals
possessed over the new railways in point of
economy would be more than neutralized by the
latter in point of accelerated despatch.

Besides which, the canal companies' area of
supply was necessarily limited. Sooner or later
the goods for important towns away from the
water roads would have to find their way by land,
with all the costs of double handling incidental to
the transfer. This portion of the canal com-

market

*Water
Ways*

*Canal
restricted
area*

inland companies business naturally fell into the lap of the railways, with their more numerous and direct connections. The result was inevitable, and though there are extensive districts—notably that behind Hull, in which the Aire and Calder Navigation Company plays a very useful part—in which water-carriage still occupies a position of no small importance, rivers and canals as means of inland communication have long since been killed or crippled by the railways. Possibly the day may not be far removed when the railway companies, either as finding it to their own advantage, or under pressure of public opinion may decide to revive the use of the neglected water-ways. To this subject we will return.

railways
On the introduction of the railways, London, the capital and the chief port of the country, at once became their terminus and starting-point. All the cities and important towns of the country were placed in touch with London, and it was the population thus served by the port which served to make the port; and no doubt many a tall ship which before had traded with another port found it to her advantage to bring her cargo to the chief market of the country, the more so inasmuch as she would at such a port have an improved chance of a cargo for her outward voyage. The result of

this attraction of trade to London would be that the minor ports would get their supplies from London by coasting craft instead of direct, and would be the less inclined to lay out money in providing accommodation for ships of increasing draught. No doubt, for example, the Newfoundland trade with Poole, Bristol, Gloucester, etc., was ultimately destroyed by the facilities offered by London, and later by Liverpool.

Having thus discussed the history and circumstances of ports generally, and briefly reviewed the origin and vicissitudes of those in our own country, let us glance more particularly at the origin and development of London, the greatest port the world has yet seen.

Its existence as a trading centre is of great antiquity, for, as Mr. Lethaby tells us in his 'London before the Conquest,' Tacitus, writing in A.D. 61, referred to London as an *oppidum* 'not dignified with the name of a colony, but celebrated for the gathering of dealers and commodities.' For such a purpose its position was, in fact, ideal. Situated on a tidal stream, which to vessels both arriving and departing served the rôle of tug, and so placed as to be in easy communication with the Low Countries and the Baltic cities, its advantages were great.

PORTS AND DOCKS

As a distributing centre, moreover, its position was unique. The Thames itself, the Medway, and the Lea, afforded facilities for transport near at hand, whilst the city's proximity to the navigable streams of Essex and Suffolk rendered it a convenient source of supply to the inhabitants of the districts which they served. London was so situated as to be a centre of distribution both for the English cities of the south and also for the foreign ports across the narrow seas. As such, her advantages received the widest recognition, and the prosperity of the city grew apace.

With an important population of her own and within her area of home-supply, and with remarkable facilities for distributing amongst the ports of the Continent and of Northern Europe the cargoes brought to her, it was natural that, as in course of time England became the carrier for all the world, so London should become the focus of the world's trade.

And the adoption of steam navigation greatly consolidated her position. For while the big sailing vessels continued in a lessening degree to carry on the trade with distant parts, a fleet of small steamships served to distribute these sailing-ship cargoes in all directions and to many a European port. On the other hand, foreign mer-

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chants and manufacturers used London as their port of shipment to countries with which London was in constant trade. With the opening of the Suez Canal, a marked and rapid development took place in the trade of the port, and more especially in the character of the vessels bringing it.

For whereas in 1860, of the 11,177 vessels which entered the port, 8,871 were sailing ships, with a total of 2,229,748 tons, as against 2,306 steamships of 751,662 tons; in 1901 the sailing vessels had fallen to 1,960 in number, with 778,323 tons; whilst the steamers had increased to 9,457, with a total of 9,214,430 tons (*vide* table on p. 66). And whereas the average tonnage of the steamships was in 1860 only 326 tons, this average had in 1901 increased to 974 tons.

It must, however, be understood that a vessel which enters the port, say, once a week, goes down in the year's returns as fifty-two vessels; and as the vessels which enter most frequently are the short-voyage steamers of small tonnage, the average tonnage of the vessels visiting London is thus greatly reduced. Assuming, for example, that a 1,000-ton steamer makes ten voyages to and from Antwerp while a 5,000-ton vessel makes one voyage to and from Australia, we have eleven vessels as the total number, and 15,000 as the total tonnage;

average (11 into 15,000), 1,364 tons, as against the real average of the two vessels, 3,000 tons.

As regards the size of individual vessels visiting the port, year by year it has steadily advanced. Thus, in 1838, the biggest ship afloat, then a very big ship indeed, was the steamer *British Queen*, 234 feet long and 2,016 tons gross. The biggest vessel now* trading is the *Celtic*, 700 feet long, and 20,880 tons; but the new American grain-carrier, the *Minnesota*, appears on the books as 21,000 tons. The gradual increase in size is shown, in its various steps, in the table on p. 69. But while the leviathan *Celtic* sails from Liverpool, we have many large vessels trading regularly with London, several vessels of the (late) Atlantic Transport Company, now in the 'International Combine,' exceeding 13,000 tons gross register.

London's trade with the Continent, for which the advantages of the port are unique, is naturally carried on by small steamers, although even the size of these is steadily increasing. As the result of this class of trade, London's average tonnage per vessel is low. Thus in comparison with Liverpool, whose trade is mainly with American and other distant ports, London's average is only 878 tons, as against Liverpool's 1,867 tons. Glasgow's average, like that of Liverpool, is also

* *I.e.*, August, 1903.

high—1,471 tons. Hull, whose trade, still more than London's, is with European ports, has an average of only 802 tons.

Liverpool's import tonnage, though by no means entirely attributable to her trade with the New World, is largely so accounted for, almost all the cotton from the States coming to the Mersey; whilst the frequent voyages of the large Atlantic liners which make Liverpool their home tend greatly to build up its average tonnage. The history of the rise and growth of Liverpool, differing so widely as it does from that of London, is very interesting. As compared with London, it is a port of almost yesterday. No doubt the Plague of London and the presence, at one time so frequent, of hostile Dutch fleets in and about the North Sea and the Channel, did something for the trade of Liverpool. But the real history of her rise and amazing progress may be written in the one word 'cotton.'

Liverpool
growth

history

In 1784, as we read in Mackenzie's 'Nineteenth Century,' eight bags of cotton landed in Liverpool from an American ship, were seized by the Customs on the ground that cotton was not a product of the United States. In 1793, as the result of Elihu Whitney's discovery of a method of eliminating the seeds of this useful product, the

flood-gates of prosperity were opened on the port. In the following year about $1\frac{1}{2}$ million pounds' weight of cotton were landed at Liverpool for the town of Manchester. In eight years the import had grown to 21 million pounds' weight. In 1901 we imported £42,000,000 worth of cotton, of which £33,000,000 was received at Liverpool, and £6,000,000 passed Liverpool for Manchester direct. Of the whole £42,000,000, £32,000,000 came from the United States.

Then the development of the uses of steam called into existence densely-populated manufacturing cities, which looked to Liverpool to supply their needs, and the importations of corn and foodstuffs for the teeming populations and their live-stock continually increased. Broadly stated, Liverpool's is a manufacturing, London's is a residential trade.

Liverpool affords a notable instance of how the population may make the port, while the port itself has no great population. For while Liverpool's own population is only about one-tenth of that of greater London, her imports amounted in 1901 to £132,000,000, as against London's £170,000,000.

It must, however, be remembered that London obtains no inconsiderable portion of her own

Hull (overseas)

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supplies, perhaps some £60,000,000 or thereabouts, through the various Channel and North Sea railway ports, which are credited with their own returns. The imports at Dover and Folkestone, for example, are about £10,000,000 and £11,000,000 respectively, without counting Southampton, Newhaven, and Harwich, which, in the matter of Continental supplies, are essentially conduit-pipes for London.

Third on the list of the ports of the United Kingdom comes Hull; next Glasgow. Dealing with their trade severally, in round millions sterling the figures for 1901 are these :

				EXPORTS.		TOTAL TRADE.
				IMPORTS.	British Products.	Foreign and Colonial.
London ...	...	...	170	57	35	262
Liverpool	...	...	132	90	16	238
Hull ...	...	...	32	15	6	53
Glasgow	...	...	14	16½	½	31

Hull, no doubt, owes her remarkable prosperity in a great measure to the same populations which have built up Liverpool, Liverpool's deficiencies due to her position in the matter of short-voyage trade, being made good by Hull. The supplies of

produce of various kinds which we obtain from the Continent, the Low Countries, and Northern Europe come to the south mainly through London, and to the north mainly through Hull. But in the matter of facilities for inland distribution Hull occupies a position quite unique.

HULL
The city itself is a remarkable example of the concentration of the means of distribution, for the cargo which comes to Hull to remain must be a comparatively small proportion of the whole. Bristol, for example, with a population of some 330,000, imports only about £12,250,000, whereas Hull, with her 242,000 inhabitants, imports £32,000,000.

The remarkable success of the port of Hull is no doubt mainly attributable to her convenient situation as a mouth through which the Continental and Northern Europe ports can feed the manufacturing populations behind her. Mere convenience of position, however, is not enough in itself. You must have corresponding facilities of conveyance between the port and its industrial hinterland; and it is in this respect that Hull's circumstances are unique, and that Bristol has probably suffered.

A study of the map of the inland waterways communicating with Hull, together with the tonnage

returns of the Aire and Calder Navigation Company, the Leeds and Liverpool Canal, the Sheffield and South Yorkshire Canal, the Rochdale Canal, and many others, affords ample demonstration that the Humber, the Ouse, and the Trent, with their network of canal connections, still fill a useful part in goods' carriage, the active competition of the railways notwithstanding.

The docks of Hull are, however, most liberally supplied with railway-lines; the docks themselves are, in fact, all railway-owned. The long fingers of the iron road grasp and encircle them at every point. *Railways*

The city is an object-lesson in the possibilities of port connections. The whole mercantile city is a medley of transport facilities. Quays and sheds, roads and railways, goods' stations and sidings fit one into the other like parts of a puzzle map, whilst keels and lorries, barges and trucks, are thick in competition.

When the port shall have been provided with the increased deep-water dock accommodation which has too long been only talked about, it can hardly be doubted that Hull will take a higher place as a destination for the ships from distant seas, the more so as her facilities for providing and shipping coal for outward cargoes are already good; and the port which is able to furnish a cargo,

GLASGOW (an export port First,
import " Secondly,

even of coals, for vessels on completion of their discharge, is thereby rendered more attractive.

It is, indeed, just this advantage to which Glasgow owes much of her prosperity; for not only does the port insure to the vessels which bring her, in such large quantities, iron ore for smelting, a return cargo of coal for their foreign loading ports, but in addition she is able to furnish a good supply of finished iron, of machinery, and rough manufactures. The result to the port is that many vessels from distant ports to London and to Liverpool proceed, on discharging at these ports, to Glasgow as a loading port, and no doubt carry there both goods shipped at their last port of discharge and part cargoes from their foreign starting-point.

As will be seen from the figures shown above, Glasgow, though fourth on the list of ports in the total of her trade, has the advantage over the other three that, whereas their imports greatly exceed their exports, Glasgow sends away more than she receives.

Glasgow is a wonderful port, a splendid testimony to the dogged persistence of the Scot. For while other ports with a tradition to maintain and natural advantages awaiting development have been content with the day of small things, Glasgow

has laboriously grubbed out a shallow river, far from the highroads of trade, and created for herself a port which offers, and offers with success, facilities to vessels of practically the largest size.

A century and a half ago there existed in the Clyde patches of shallow on which the depth at low water was one of inches only. In 1768 the city set to work to narrow the river, then a wide and shallow stream, in order to increase its depth and scour. The primitive dredgers of those days having excavated a navigable channel of 7 feet, this depth was soon increased by the scour to 14 feet. Ever since then the process of dredging has been steadily maintained, the invention of the steam-dredger having enabled the port authorities to excavate a channel which in the early history of the port would have been regarded as equally impossible and unnecessary. With the marvellous dredgers now available, however, practically any river depth has become possible, while the steady increase in the size and draught of ships renders a depth, which was ample yesterday, barely sufficient to-day and obviously destined to be outgrown to-morrow.

But deepening of the Clyde over its 20 miles of length was by no means the whole of Glasgow's costly enterprise. The banks at the city had to

be equipped with quays. Long before the Clyde was rendered navigable—when vessels of any size, even by the standard of those days, could not get within 14 miles of the city, but discharged into cobbles or craft of three to six tons' burden—so long ago as 1662 the magistrates decided to construct a quay wall, 'ane little quay builded at the Broomielaw.' In a paper recently read by Mr. W. M. Alston, C.E., Chief Engineer of the Clyde Navigation Trust, the history of the gradual process of the quaying of the Clyde is discussed from its engineering aspect. The process was one from experiment to experiment, good work having time after time to be reconstructed, as the continual deepening of the river's bed affected the foundations. But the system of river quays answered well, and when eventually it became imperative to increase the shipping accommodation at the city, tidal docks—i.e., docks without locks or gates—were created, greatly to the benefit of the port.

Railways

But what in later times has given a peculiar value to the river quays has been the railways laid along them and extended to the docks. Thus whether it be a question of loading a ship with coal, or of a ship's discharging a cargo of iron-ore, the trucks are always conveniently placed.

And if, as has of late too often been the case, the discharge of the ships has been delayed, the fault must be charged to a deficiency of railway-trucks rather than to any defect in the system or working of the port. This delay of shipping, however, is beginning to react on the general accommodation of the docks and quays, and, like other ports, Glasgow is becoming congested. But a new dock is now in construction for the coal and ore trades, and on its completion Glasgow should be able to concentrate her general trade, notably with Transatlantic and Eastern ports, practically at the heart of the city. Great and well-deserved as has been the success of the port, there is no reason to doubt that a still brighter future awaits it.

CHAPTER II

THE VARYING FEATURES OF DOCKS AND PORTS

PORTS differ greatly amongst themselves, and in a variety of ways. Thus we have the port which is essentially a receiving-port, and the port which ships as much as it receives; the port which, like Cardiff, has a large export trade, and comparatively little imports—she exports, in fact, about £12,000,000, as against £3,500,000 imports; or which, like Bristol, has a good import business and little export trade; or which, like Southampton, is practically a glorified railway-station, a point of junction between the ships and the railway-trucks.

Then, again, ports differ in the nature of their accommodation. Liverpool, for example, is a port of closed docks; every ship has to enter or leave the dock by the process of locking in or locking out, and there are no riverside wharves, or practically none. London, again, is a port of

closed docks, but with a vast array of wharves and warehouses bordering the river, which wharves are, however, for the most part, if not entirely, used by steamers of light draught. Glasgow, as we have seen, is a port of open quays which are partly on the river, partly surrounding tidal or gateless docks. The comparative merits of these differing systems we will presently consider at greater length.

Then there are essential differences between port and port in the method of discharge and delivery. In London, for example, some 75 or more per cent. of the general cargo to the port goes overside into barges for conveyance to riverside wharves or warehouses, or to waterside depôts of the railway companies. London

At Liverpool, barges are practically unknown. Goods are delivered mainly into transit sheds, and thence conveyed to the railways. So far as practicable delivery is made to railway-trucks, but in the matter of railway connections Liverpool's dock facilities are far from perfect, and notably in her means to supply outgoing ships with coal. Liverpool

At Hull, some 80 per cent. of the cargoes goes, as in London, overside into craft to find its way to the mills and warehouses on the river Hull, to the Ouse, the Trent, and other of the numerous

waterways of the district. The remainder goes mainly into railway-trucks, but the two rival railway companies at the port each do their best to cart imported goods from the other's docks to their own particular depôts for despatch inland. It has already been mentioned that all the docks of Hull are railway-owned.

At Glasgow, the city's extensive coal and ore trades are carried on by rail to the ship's side, while the general cargo is carted to the various stores. As at Liverpool, barges at Glasgow are practically unknown.

As a general rule, the course of outward shipment at any port follows more or less the system of inward delivery. These differences in the method of discharge and delivery of inward cargoes involve in their turn differences in the kind and extent of the dock facilities. Where, for example, discharge is largely into craft, the vessel's own whips and gear will largely be used for passing the cargo overside, and there will be the less need for dock-cranes. Where large cargoes, as at Liverpool, have all to be conveyed away by land, capacious transit-sheds are necessary, and an abundant supply of dock-cranes to expedite the ship's discharge.

It therefore by no means follows that because

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at a given port we find an abundance of capacious double-story sheds and an array of shore-cranes, and at another port comparatively small sheds and few cranes, that the former port is better equipped than the latter. Before the facilities of a port can be fairly estimated an accurate knowledge is needed of the process of discharge customary at the port.

The port of Bremerhaven serves well to illustrate this. There the cargo-sheds are few, and the sheds themselves of small capacity, and internally of most inconvenient structure, while of cargo-cranes the quays are practically bare. But the fact is that the discharge at the port is mostly into barges overside, to be towed to Bremen or perhaps elsewhere; and the ships do their own discharging. The huge steamers of the North German Lloyd Company, which bring cargo to the port, are evidently equipped accordingly; one of these vessels discharging there the other day simultaneously over both rails into barges alongside, carried on each of her four masts no less than eight cargo-booms, while another vessel, of the same line, a two-master, carried at each end eight pivot-cranes; and a very curious appearance they gave to her.

In other ways, also, ports differ one from the

other, and notably in their ownership or financial support. In London, for example, the docks are at present the property of public companies whose object is naturally to work the docks primarily in the interests of the shareholders—an object, however, entirely consistent with, and indeed implying the due development and up-keep of the undertaking. At Liverpool the docks are worked by a trust, in the interest of the trade and traders of the port. So also at Glasgow. At Hull the docks, as already stated, are railway property, which also }
is the case at Southampton.

Then across the narrow seas we have at Antwerp the closed docks built and equipped by the municipality, while the open quays are constructed by the State, and on completion handed over to the municipality, which equips and maintains them. At Hamburg the port is run jointly by the State (of Hamburg, not Prussia) and the municipality.

At Copenhagen the system is somewhat complex. The land and water area for the port's magnificent tidal docks or harbour was provided by the municipality, while a syndicate of leading city men undertook to equip and manage the new harbour on its completion, the income to be annually divided in certain fixed proportions

between the municipality and the syndicate,—or so it is understood.

It is easy to see that the rates and dues to be levied by the dock proprietors are likely to depend largely on the nature of the ownership.

Where shareholders have to be provided with dividends the charges are likely to be made as heavy as the trade will stand without risk of driving it from the port.

Where the property is vested in a public trust, the object will be to charge only such rates as, after paying interest on borrowed capital, will suffice to maintain and provide for the development of the undertaking.

Where a railway company is the proprietor, the dock will be worked and regarded less as a source of profit in itself than as a means of supplying freight for the company's rolling stock. It may be guessed that docks so owned are often, if not generally, or even always, worked at a loss, very much to the benefit of the country's trade.

Under the Continental system of municipal ownership also the docks are worked not for profit, but for the benefit of the trade of the port.

But while in such case any loss on working must sooner or later come out of the city rates, under the system of railway ownership any loss on the

docks will be regarded as part of the cost of running the railway as a whole.

Bristol docks are municipal, and it would seem that to some extent they are carried on at the cost of the rates. If, however, the fact be so, the city doubtless receives infinitely more by the trade gained through the docks than the ratepayers pay towards their up-keep.

The Manchester Canal, though the property of a company, is, as the consequence of its disappointing financial result, under heavy debt to the corporation, which is accordingly strongly represented on the company's Board of Direction. To this great undertaking we will presently give a closer consideration.

It will be seen from the foregoing that ports differ one from the other in various and essential points. But while one may examine the system of a port without observing anything to indicate the nature of the ownership—which, indeed, need have no outward effect at all on the plan or methods of the port—the special nature of the accommodation at once invites attention.

There is a wide and obvious difference between closed docks and tidal docks or basins, and a still greater difference between closed docks and open or river quays.

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Amongst our own ports, London, Liverpool, and Hull are exponents of the closed-dock system. Glasgow and Southampton follow the plan of tidal basins and open quays.

Across the water, Bremerhaven is provided with closed docks, while Bremen has tidal basins, as also has Hamburg.

At Antwerp the closed-dock system and the river-quay system exist side by side, and the river quays are being extended, whilst at the same time new closed docks are also to be proceeded with. If at the moment Antwerp's open quays are, for the biggest vessels, more successful than her docks, it is that the quays, or certain of them, are modern and up-to-date, while the docks are obsolete. The decision to continue and develop both methods of accommodation side by side is evidence that, at any rate at Antwerp, it is considered that in practice one system is as good as the other.

But here, again, it must be borne in mind that while this may be true enough at Antwerp, it does not follow that such will be the case everywhere else. At Copenhagen, for example, where the rise and fall of the tide is so inconsiderable that, for present purposes, it may be regarded as non-existent, closed docks would obviously be out of

place. To lock vessels into dock, and lock them out again with the water in the docks and the water outside always at practically the same level, would be absurd.

Conversely at Avonmouth, where the tide has a maximum rise of 50 feet, to provide open quays which, without counting the foundation, would need to be somewhere about 90 feet in height, would be ruinous.

At this port open quays or tidal basins may be the best method; at that, closed docks. At another it may be a matter of opinion which system to adopt, and perhaps the one may be as good as the other. But even when such a conclusion has been arrived at, from the point of view of practicability and convenience, the question of expense has still to be considered. And if on investigation it should prove that, owing to the nature of the soil or of the river bed or banks, one system will be more expensive—possibly vastly more expensive—than the other, then clearly the two systems cannot be regarded as equally suitable for the particular port.

This question of closed docks *v.* tidal docks or river quays has of late been so frequently discussed, and so much misapprehension has attached to it, that it may be well to consider it somewhat closely.

And it is a question which requires to be looked at from two aspects—that of cost and that of the balance of advantages.

Let us deal first with the money aspect. Now, the cost of providing a lock, with its double sets of ponderous gates, and the costly hydraulics to work them, is naturally a very serious item in the construction of closed docks. For the depth of the lock has to be that of the docks, plus the difference, or half the difference, or whatever may be decided upon, between high and low water at the lock entrance. And it may naturally strike the casual critic that if by providing a tidal dock instead of a closed dock this costly incident of the locks can be dispensed with, here at once will be a substantial saving.

But this is to overlook the material fact that if you do away with the lock you must make the whole dock as deep as the bottom of the lock.

Let us see this clearly. Say the river at the tidal dock entrance is 18 feet deep at low, and 38 feet deep at high, water,—tide 20 feet; and that you want a dock in which ships drawing 30 feet can lie always afloat. This means that, when at dead low water there is only 18 feet in the river, you must have 12 feet more in the tidal dock;

Advantage Lock Port

Tidal Dock

that is to say, you must dig your dock 12 feet deeper than the bottom of the river just outside the dock.

This will appear more clearly if we assume the case of the closed dock, with 18 feet at dead low water in the river, and 20 feet rise. At high water there will be 38 feet in the river. Our ship draws 30 feet, consequently she can come outside at just after half of flood tide—that is to say, when the tide has made 12 feet out of its 20 feet.

As a matter of practice, things are not cut so fine; a foot of water, or not much less, is allowed under the vessel's keel. And for very good reason. Rubbish may have temporarily accumulated at the bottom of the lock, or a ship's fender, or some such solid object, may have fallen into it, and if the margin be cut too fine, there is the possibility of the ship's becoming fixed.

Some time ago, at an east coast port, a ship did thus stick, though not exactly in the lock, and with disastrous consequences. When half across the sill between the lock and the dock she stuck fast, with the result that, as the tide fell, the water ran out of a chain of docks, and every ship grounded. It appears that the outer gates being for some reason disabled, the vessel referred to

was coming in 'on the level,' and when she stuck on the inner sill and the tide fell, there was no possibility of holding up the dock water.

Every lock has two sills or thresholds, solid structures rising a foot or more above the floor of the lock, one of these sills being at the river entrance, the other at the dock entrance. The ponderous double gates of the lock travel on rollers on a special path. At their lower edge the gates are, when closed, forced by the tremendous pressure of the water in the dock or in the lock, as the case may be, firmly against the sill. The gates are thus made practically water-tight at their lower edge, whilst the sills also serve to hold the gates in position.

Let us imagine that the lock is empty, and that a vessel is entering from the river. On being hauled into the lock, the outer gates are closed and the sluices communicating with the dock are opened. As the water in the lock rises, the heavy outer gates are forced together and against the sill, creaking and straining under the mighty pressure. Foot by foot the water rises, and with it the ship. When the lock is full, the gates communicating with the dock are slowly swung back, and the lock then becomes part and parcel of the

*N.B. Lock to Victoria Dock
takes about 25 minutes
to get a vessel through*

dock itself, though of considerably greater depth. The vessel is hauled into the dock, and the full lock is then ready to lower into the river a vessel which has to come out.

Here the process is reversed. The sluices at the river end of the lock are opened, the gates at the dock end of the lock groan and strain together, and the water in the lock sinks and sinks till it is at the river level. Then the river gates are swung open, and the lock becomes part and parcel of the river, and ordinarily of the same depth. With a lock 600 feet or 700 feet long, 80 feet wide, and perhaps 25 feet deep above low water level, the volume of water thus extracted from the dock must be appreciable, and the level of the water in the dock has, unless the dock be very deep, to be restored by pumping in from outside. But most docks cannot be entered before half-tide.

In order to reduce this waste so far as possible, when the lock is of great length an additional or half-way pair of gates is provided over and above the ordinary gates, so that small vessels can be locked in and out with only about half the loss of water.

When, like the Thames and the Humber, the river carries much mud in solution, this is a serious



LOCK GATES AT THE NEW DOCK, LEITH

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matter for the dock, in the still water of which the mud settles to the bottom, necessitating constant dredging. Not long ago, during some work at the entrance of the South-West India Dock, the mud accumulated to a depth of 10 feet in a few weeks.

At Tilbury Dock the dredging is to some extent diminished by the use of 'blowers'—small tugs carrying pumping engines which project a powerful jet to a sort of rake, which stirs up the mud at the bottom of the dock in the neighbourhood of the lock, the mud thus displaced being drawn into the lock and thence carried back into the river. The mud dredged from Tilbury Dock averages 187,000 tons a year.

To return, however, to the comparison of cost as between closed dock and tidal dock. The depth of the latter has, broadly stated, to be increased to the extent of the height of the tidal rise and fall; the greater the range, the greater the height of the tidal dock's quay walls.

Thus, with a low-water depth of 18 feet and a 40-foot tide, a 30-foot tidal dock would have to be about 40 feet deeper than a 30-foot closed dock—a serious matter over a large area. Tilbury Dock has, exclusive of its tidal basin, an

Heavy
Cost
Tidal
Quay

area of 53 acres—the same acreage as that of the Alexandra Dock at Hull; the Alexandra Dock at Liverpool, 44 acres; the New Dock at Avonmouth is to be only 30 acres, but ‘with land for extensions’; the Royal Albert Dock on the Thames has a water surface of 73 acres inside the lock.

Accepting 50 acres, however, with a Bristol Channel rise and fall of, say, 40 feet, as our standard, it follows that the weight and bulk of soil to be excavated will be very great. And the soil has not only to be dug out, but trucked or transferred to barges or hoppers, and by them carried away perhaps many miles to sea—in the case of such a large mass of material a very expensive operation.

And this is only the first step, for solid walls have to be carried down to the additional 40 feet of depth round the whole dock. And quay walls are like other walls in this—the higher the wall the wider the base. And this is not all. For while in the case of the closed dock you have always a full dock, with the pressure of its full mass of water as a support to the walls, in the case of the tidal dock at very low tide 40 feet of the walls are left without this support; so that

Water
Support
Walls

their strength and solidity has to be on a commensurate scale. A very expensive business, wall-building for a tidal dock, when a considerable rise and fall has to be reckoned with. This is in the case of the tidal dock as distinguished from tidal quays.

When tidal or river quays have to be provided the cost of construction is much greater. For while the open dock can be excavated in the dry, and the river entrance cut only when the dock is finished, in the case of bank quays the foundations have to be dug and the lower part of the walls built under water. This means either working under compressed air or behind costly caissons. So that it is easy to understand the great cost of the river quays at Antwerp—three times, or even five times those of the closed docks.

*Quays
most
expensive
of all*

Then, as Antwerp knows only too well, unless the soil be such as to give a solid bed to the foundations, there is always the possibility of the walls slipping into the river. Quite recently this has actually happened, 100 metres of new quay having thus slipped, whilst for the distance of 150 metres in another place the land behind the wall sank 3 feet.

It is sometimes urged that open quays can be constructed cheaply and efficiently of timber

instead of stone or cement, and that there is a future for such structures in the Thames. But the Belgians, who are not reputed either reckless or extravagant, employ stone and concrete for their Antwerp quays, and at Glasgow also the same materials are largely used.

M. Royers, the Antwerp municipal engineer, and Mr. Alston, Chief Engineer of the Clyde Navigation Trust, have both been kind enough to justify this preference. It is explained that while timber may answer where depths are moderate and the ground good, in other cases solid work is to be preferred—work which its own solidity will serve to keep in position. Wooden supports, apart from their inadequacy where cargo-sheds, cranes, and railway-trucks have to be carried, are always liable to damage by fire, by shipping, and by worms. Moreover, wood alternately dry and wet is apt to decay, and not only is the cost of repairs a serious item, but during repair the use of the quay is interfered with. To use timber good and solid enough to do the work of stone or concrete quays would cost nearly as much as the latter and be less durable. So that in the long run the best economy will doubtless be the more solid and expensive work.

To return, however, to our comparison. A tidal dock, as it would seem, is much more costly than a closed dock, and river quays are still more costly than a tidal dock, the degree of difference in each case depending on the rise and fall of the tide. In the case of tidal docks dredged below the bottom of the river, the cost of the mud removal is prohibitive. It was stated before the Royal Commission that such docks for London would involve a dredging bill of £300,000, as against the present £30,000.

As to the advantages on the score of con-
venience and safety, they are all in favour of the closed dock. It is true that with the last-mentioned system there is some little loss of time in the locking process—between thirty minutes and an hour—but this is of no serious importance, and is greatly outweighed by the advantage of a berth out of the flow and out of the rise and fall of a flowing stream.

As to the random assertion that a vessel can come alongside a tidal or open quay 'at any time,' we have already seen that in this respect the lock, the tidal entrance, and the open quay are all on the same footing, and that you can no more bring a ship drawing 20 feet alongside a tidal quay when

there are only 10 feet in the river than you can bring her up to the lock entrance. A vessel of light draft, a vessel drawing no more than the low-water depth of the river, can of course come alongside an open quay—or enter or leave dock—at any time, but a vessel drawing more than this must obviously wait for the necessary rise of tide before she can approach either quay or dock. Whatever the system, its working is dependent absolutely and in the same degree on the depth of the navigable approach to the system.

CHAPTER III

RIVERS, TIDES, AND DREDGERS

AT this point we may perhaps conveniently devote a little consideration to the subject of rivers, from the point of view of their navigation, and to tides. In our brief reference to Glasgow we have already noticed what marvels may be brought about by training-banks and dredging. The effect of a training-bank is to force the stream to follow a certain channel. The flow of a river is itself a powerful excavator and obstruction-remover. If the constant dropping of water, as the old adage tells us, will wear away a stone, much more will the constant scour of a river, artificially contracted, wear away the shingle and ballast of its bed.

In a very few years the effect of narrowing the wide and shallow Clyde was to cut out and add to the channel 7 feet of the river's bed.

When the bed happens to be rock, other means

have to be employed—the drill and the blasting charge. And the Clyde has in this respect ‘smelt powder’ to no small extent. But in most cases the deepening of channels is a matter of dredging, and a modern steam-dredger, with its great size and power, is a thing to marvel at. From an æsthetic point of view it is certainly not beautiful, but in other respects it is a case of ‘handsome is as handsome does.’

If it is a question of deepening a channel, the mighty endless chain of sharp-edged steel scoops is lowered to the exact depth, the steam is turned on, and an unceasing flow of ballast is poured, as the capacious scoops revolve, into the dredger or into the huge barge or hopper lying fast alongside.

If it is a question of excavating or deepening a dock, an adjustment will be made to the exact depth required, the dredger will be moved to and fro over an exact plan, and the bottom of the dock will be cut as level as a table,—or so we are told. But no doubt, as with divers so with dredgers, a good deal has to be taken on trust.

Or if a creek or channel has to be cut straight in from the bank, the dredger’s huge nose will be pressed against it, and she will eat her way into the land like a cow into a turnip, and make her own floatage for her further advance. It was

mentioned recently in the press that somewhere in the United States—Missouri, was it?—a very large tract of marshy ground is thus being given to pasturage. The dredgers cut their own canals through the swampy tract—it might almost be said overland—discharging the spoil overside to form a high bank on either side, as they eat their way onwards, and into these canals the marsh land drains itself.

Of such great importance is the dredger in the modern development of ports and rivers that something more than a passing reference is due to it.

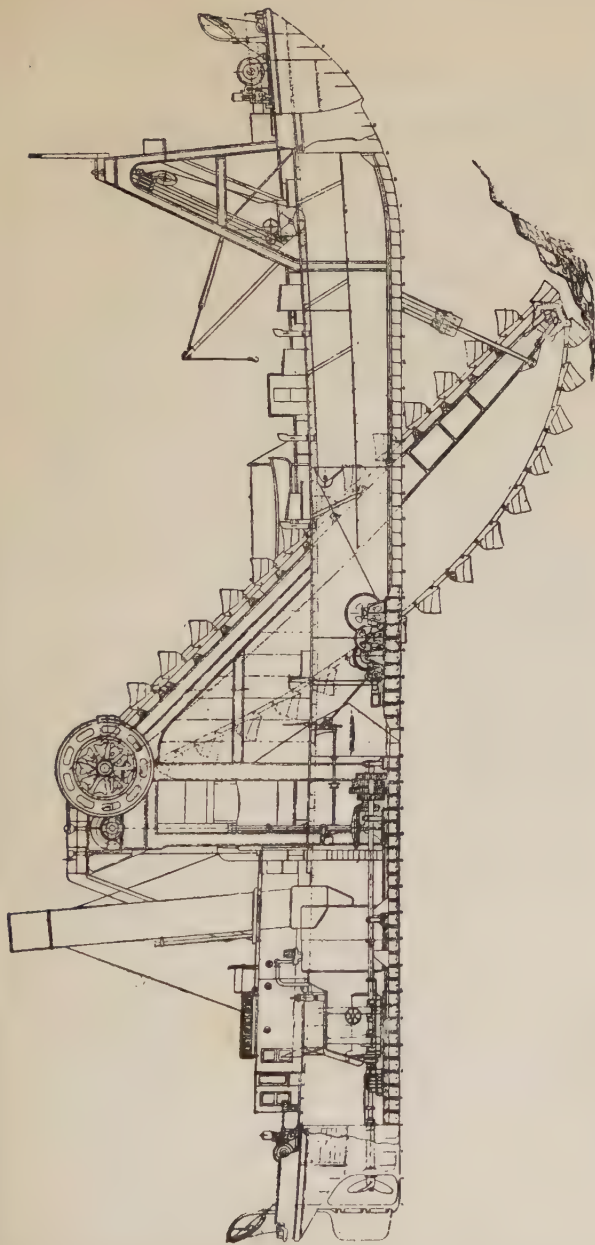
Broadly stated, dredgers are of one of two types—the bucket-ladder and the suction-pump. That most generally used is the bucket-ladder. Of this type the following sectional diagram, which the editor of *Transport* has kindly permitted me to reproduce, affords an excellent illustration.

It will be noticed how the ladder of buckets can be raised or lowered as the depth requires. This design is for bottom dredging, but it can be so varied as to project the buckets at the very nose of the vessel, or immediately beneath what sailors call her 'fore-foot.' The ladder can be lowered to a depth of 40 feet or even more, or brought close under the bottom of the vessel.

As to the power and capacity, it is just a question of pounds, shillings, and pence. There are afloat in various parts of the world dredgers of very great size and power—at least in one case, with each bucket of a capacity of $1\frac{3}{4}$ tons, and with a total power of lifting 2,000 tons in an hour.

The suction-pump dredger has, in place of the chain of buckets, powerful suction-pumps, the capacious maws of which are drawn along the bottom. The Natal Government has now in use two of these mammoths, which are capable of lifting 3,000 tons of sand in the hour. But though intended only for such work, pump-dredgers are not particular, and practically anything, no matter how solid or heavy, over which the pump's huge gullet passes will straightway find itself 'safe aboard': come it must.

It is this class of vessel which has done so much for Liverpool. In 1890 the minimum depth on the Mersey bar was 11 feet. The all-devouring dredgers were set to work on the bar, and its depth has now grown to 27 feet. I well remember arriving from New York some twenty years ago at low tide, and having to be transferred at sea to a small passenger-tug to cross the bar. But there was not even enough water for the tug, for she bumped violently in crossing, jerking a cloud of



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SECTIONAL DIAGRAM OF THE BUCKET DREDGER *MICHAEL LISSOVSKY*.

sparks from her funnel and considerably disconcerting her passengers. To-day big steamers pass through a deep and wide channel where the shallow little tug bumped so alarmingly.

The Mersey Dock Board commenced their present system of dredging in 1890. Since then they have raised 80,000,000 tons of sand from the navigable channel at an annual expenditure of some £36,000. The whole cost, dredgers and repairs included, amounts to about £520,000. The chairman of the Board stated the other day that by this outlay the port had been saved from degenerating into a second or third class place, and no doubt this is so.

The kind of dredger to be used depends on the spoil to be lifted. To lift loose or light sand or mud by suction-pump is a very easy process, but a very wasteful one, as, owing to the lightness of the material, much of it finds its way overboard again with the water overflow. Such material, lifted by the bucket, is dumped in pretty solid.

A remarkable dredger—or, rather, dredger-arm—was used in the construction of the Suez Canal. To enable the spoil to be landed direct on the desert, an arm was attached to the dredger 225 feet in length. This arm, supported in the middle on a pontoon, was a trough or channel

5 feet wide and 2 feet deep, with an incline towards the shore. Water was discharged into it simultaneously with the spoil, and an endless chain, with rakes attached, kept constantly on the move, automatically conveyed the canal bed, as it was excavated, to the shore. When we remember that London's well-known 'Monument,' the city's lofty memorial of the Fire of London, upraises its giant column to a height some 20 feet less than the length of this long-reaching arm, we get an idea of the possibilities of the modern dredger. Several of these gigantic machines were simultaneously at work, with the result of an excavating and shore-piling of 2,763,000 cubic yards a month.

Some dredgers are 'hopper' dredgers—that is to say, receiving and carrying away the stuff they lift; others, dredgers which discharge into a hopper barge alongside. These hopper barges are some of them 'dumb' craft which have to be towed, while others are provided with their own motive power. To enable them promptly to discharge their load into the sea, they are provided with bottom doors, which may be worked either by hand-cranks, by steam power, or by hydraulics. The hoppers used in connection with the dredging of the London docks are very large iron craft which are towed out, half a dozen at a time, to

Barrow Deep, a dumping-ground some twenty miles beyond the Nore. There arrived, the heavy cranks are worked which open their floors to the sea. The muddy load slowly settles and sinks, the sea all round becomes deeply discoloured, and the hoppers' dripping iron sides rise and rise till the huge unwieldy craft sit like castles on the lopping waves.

But dock dredgings, consisting as they do of mud and coal—the quantity of coal dropped into the docks in the process of 'bunkering' steamers is incredibly large—and dock débris of all sorts, are not always the hoppers' burden. When it is a case of deepening the shingly bed of a flowing stream it is quite another story, and the Thames in some of its reaches flows over more or less golden gravel. And no doubt in the early history of the deepening of the river the value of the 'spoil' was not without its influence on the direction of the operation.

But a large part of the dredging of early days was undertaken neither for the value of the gravel or shingle nor for deepening the channel. For before the introduction of the steam collier coal was brought to London by fleets of sailing craft, and as these had all to return in ballast, they dredged it up for themselves the best way they

could. As they largely lay on the ground at low water the process was no doubt much facilitated. It is said that at Newcastle there is to this day—or was until recently—a large bank of Thames shingle, discharged by the colliers on their return for a fresh cargo for the great city's countless hearths.

During our wars with Holland the colliers' trade was greatly interfered with by the Dutch cruisers and privateers, and at one time a veritable coal famine ensued in consequence. Old Pepys in 1666 wrote feelingly on the subject: 'In much fear,' says he, 'of ill news of our colliers. A fleet of 200 sail, and fourteen Dutch men-of-war between them and us; and they coming home with small convoy; and the city in great want, coals being at £3 3s. per chaldron, as I am told.' A year later, writing on the same subject—the same burning subject, one might say—he complains: 'Such is the want already of coals, and the despair of having any supply, by reason of the enemy's being abroad, and no fleet of ours to secure them, that they are come this day (30th June) to £5 10s. per chaldron.' There was, in fact, fear of a 'mutiny' in the city at its 'great misery,' and there was much anxiety lest the Dutch should even go to Newcastle and burn the colliers there.

The quantity of ballast carried from the bed of the Thames to Newcastle must in course of time have been immense, for in 1790 alone some 4,500 colliers came up to London town, and thirty-five years later this total had increased to 6,500.* So great was their number that they seriously obstructed the navigation, and we read that about the year 1730 some seventeen recalcitrant vessels moored abreast across the stream, sturdily refusing either to unload or to budge a foot, a frame of mind from which it took nothing less than a visit of the Lord Mayor in person to remove them. The kindness of the Town Clerk and of the Secretary of the Trinity House—‘the Guild, Fraternity, or Brotherhood of the most Glorious and Undivided Trinity’—enables me to set down here the official records of this singular incident in the history of the port.

‘EXTRACT FROM THE CORPORATION MINUTES.

*‘At a Court of Aldermen, Sir Edward Beecher,
Mayor, 1 October, 1728.*

‘Upon reading a Letter from the Master and Wardens of the Trinity House at Deptford, re-

* Old prints of London show the river a forest of masts, and no doubt most of these rose above the decks of grimy colliers.

lating to the great number of Colliers, who have for some Time passed laid loaded in the River Thames, for a month or longer, from 12 to 20 ships in a row, and reaches three Parts over the Channel, and thereby not only obstruct the Passage up and down, but will raise Banks and Shoals, to the prejudice of the River; It was ordered that Mr. Water Bailiff should go down the River, and take an Account of the Names of the Ships, and the Masters, and how long each hath lain there, and in what Parish and County they lie respectively, and give an account thereof to the Right Honourable the Lord Mayor, who is desired to take such Care as his Lordship shall think most effectual for their Removal, by calling Courts of Conservacy, in order to punish them as the Law directs.'

'TRINITY HOUSE: EXTRACT FROM BYE MINUTES
OF WEDNESDAY, 8TH OCTOBER, 1728.

'Mr. Walter Bailiff attended and informed the Board that upon the directions of my Lord Mayor he had been down the River Thames and taken the names of such Collier Masters whose Ships obstructed the navigation thereof, and that my Lord Mayor would hold a Court of Conservacy

thereupon at Mr. Alderman Parsons House tomorrow morning by 10 o'clock, and desired that some of the Brethren would attend thereat, upon which Captain Stratton and Captain Denn were appointed accordingly.'

[It is instructive to note how at a stroke of the Trinity House's pen the Corporation water-bailiff has become Mr. Walter Bailiff.]

'Sir Edward Beecher, Mayor, 9 October, 1728.

'Lord Mayor held a Court of Conservacy at the Bridge House in the County of Surry, wherein it is mentioned, that this Court was especially held on Complaint, that a great number of Colliers lay in the River abreast, and refused to unlade, so that the Passage was obstructed, and the River in danger of being choaked up, and a Jury being impanelled found several Presentments against several of the Masters. Whereupon his Lordship went down the River and called on board those Ships which were presented, and the Masters promising to unlade and remove, the further Proceedings were ordered to stay.'

CHAPTER IV

THE THAMES AS A PORT

THE early history of London's river is enveloped in much obscurity. That in remote times its broad stream overflowed much of the low-lying lands of the Kent and Essex shores is, however, certain. At high water, in fact, London—'the city on the pool,' or 'the lake fort,' as some translate it—must have been nearly surrounded by the tidal flow, and the early fortifications on Tower Hill looked, no doubt—to the east, at any rate—over flood-land and marsh. Whether or not the Romans were the first to embank the low shores, or whether the work began at a later date, is all conjecture, but ever since the Norman Conquest, or not much later, the flooding of the Thames lands has been more or less the subject of anxiety.

The history of the embanking of the Thames is, in fact, the history of the draining and reclaim-

ing of its flood-lands for purposes of pasturage. In this work engineers from Holland have played no small part. From time to time, either owing to obstruction of the water exits from the land, to neglect of the embankments, or to exceptional causes, gaps have occurred with highly disastrous consequences to the land reclaimed.

And not only to the land reclaimed; for about 200 years ago so serious a breach occurred at Dagenham that 'half Essex' was flooded, and in the years which it took to repair it great quantities of soil were carried out into the river, forming a bank which threatened to destroy the navigation altogether, and this in spite of the utmost efforts of the 'ballast men.' Mr. W. W. Glenny, of the Thames Conservancy, contributed to the *Essex Review* in 1901 a series of articles in which the gravity of the then situation is well described. The cost of the prolonged efforts at repair of the great breach and the removal of the river shoals involved a ruinous taxation of the land-owners and the collection of special dues on shipping tonnage and on coal.

Up till 1853 dredging of the navigable channel was undertaken by the City Corporation. In the year mentioned the duty was transferred to the Thames Conservancy, which body acquired two

steam-dredgers, and set to work on the systematic removal of shoals and the widening of narrow channels. As the size of shipping increased, complaints became more frequent as to the deficiencies of the channel, and in 1887 a remonstrating memorial was addressed to the Conservators. 'We feel it our duty to point out,' said the memorialists, 'that an urgent necessity exists for the immediate adoption of energetic measures to improve the navigable channel between Gravesend and the docks.'

In consequence of growing complaints on the part of shipowners and others interested in the navigation, a Commission of Inquiry was eventually constituted by the Board of Trade. It is now referred to as the Lower Thames Navigation Commission, 1896, or, from the name of its chairman, the 'Wolfe Barry Commission.' The Commission, after taking evidence and making the fullest inquiries, came to the conclusion that the river needed to be considerably deepened. Amongst other things, they recommended that the low-water depth between Gravesend and the Albert Dock should be increased to 30 feet. It was then in places no more than 16 feet or 17 feet deep.

The Thames Conservancy, as the responsible

body, were, no doubt, intended to act on this recommendation or report, but though they did something, they attempted nothing on such a scale as that contemplated by the Commission.

During the recent investigations by the Royal Commission on the Port of London, some interesting light was thrown on the subject. The Chairman of the Thames Conservancy admitted the desirability of the work, and that the Conservancy understood that the 1896 Commission intended the Conservancy to take steps to carry it out; also that no such steps had been taken. The Conservancy, it was explained, had no funds for such an extensive operation, and had regarded it as useless to approach Parliament to obtain funds.

No doubt the 1896 Commission had intended the Conservancy to do something; but what the Commission said was regarded by the responsible body not as a 'mandatory recommendation' binding on the Conservancy, but rather as a 'pious wish.' 'Besides,' said their witness, 'what would be the good of dredging out to a depth of 30 feet the river up to the Albert Dock when the lock sill was considerably higher — *i.e.*, shallower? Unless the lock sill was lowered, of what practicable good could it be to deepen the river?'

The foregoing were the explanations offered by the Thames Conservancy to the recent Royal Commission. As might be supposed, the dock company, when it came to their turn to justify the depth of their lock, wanted to know of what practicable good it could be to deepen a lock below the depth of the river approach to it. How runs the old saw :

‘ Lord Chatham with his sword drawn
Was waiting for Sir Richard Strachan ;
Sir Richard, longing to be at ‘em,
Stood waiting for the Earl of Chatham !’ ?

The report of His Majesty’s Commissioners affords in this connection interesting reading.

England’s wealth and prosperity as a producing and manufacturing State are largely due, no doubt, to her natural advantages—to her coal and iron, and to her numerous sources of water-supply. But while the value of these initial advantages can hardly be overstated, they lay comparatively dormant and unused until steam with its magic wand awoke them into a new and vigorous life. England was the inventor of steam power, alike for manufacturing, for traction, and for locomotion.

In this she had the start of all the world. She was first in the field, and of this immense advan-

tage, enormously enhanced as it was by her practical monopoly of the ocean carrying trade, she made the utmost use. The ability on the one hand to bring to the fast-rising manufactories from all parts the raw material which they needed, and on the other to convert it rapidly into the finished article for the supply of all the world, gave her a position which long set competition at defiance.

In recent times, however, this supremacy has in several directions been rudely shaken. Radical changes and improvements have been effected, while a new power has arisen to contend with steam — the mighty power of electricity; and England, slow to discard the methods to which the long-continued success of her manufactures has been due, has been content to allow her competitors and former imitators in various ways to gain upon and even outstrip her.

And notably America, with her fertility of invention to prompt her to new methods, and a high scale of wages to drive her to labour-saving devices, has made great advances. The greater relative cheapness and productiveness, too, of operations conducted on a large scale has in America met with peculiar recognition. The fact has recently been brought prominently to our notice in the discussions in the press on the

economical working of her railways owing to the employment of engines of greatly increased power and of trucks of greatly increased capacity. It does not follow, of course, that such engines and trucks can with advantage be adopted, either across the Atlantic, or still less in England, irrespective of the circumstances, nor have our English railways been altogether inactive in adopting larger trucks and more powerful engines. But the fact remains that by increased cheapness of traction America is materially facilitating and benefiting her manufactories.

Innovations of this kind mean the ruthless abandonment, in various directions, of the plant and machinery of former days. But if such relegations to the scrap-heap are costly in a new country like America, where land is cheap and new manufactories can be provided in new centres of population, for us in England the case is much more serious. And no doubt England—manufacturing England as a whole—is largely under the incubus of costly plant, which modern methods and inventions have made, and are ever making, obsolete.

What wonder, then, that many of our docks and their appliances have fallen far behind the times? And the docks are obsolete, not because

of new inventions or the development of new ideas, but simply because modern shipping has outgrown them.

New docks have, it is true, been and are being made, and, notably at Liverpool, mammoth works have been undertaken in deepening old docks and in carrying the foundations of quay walls to greater depth ; but, broadly stated, the country's docks are obsolete. They are for the most part of insufficient or barely adequate depth, while some of their locks are too short, and no longer suited, in the slope of their walls, to the box-like sides of modern vessels. Their quays are often not wide enough, and the sheds which stand on them are of insufficient area.

We have grown used to the docks as they are, and their deficiencies do not fully strike us ; but it may safely be said that an engineer, having a full knowledge of modern requirements, if called upon to design a new dock and quays, with sheds and railway sidings, and with barge accommodation for to-day's and next year's shipping, would produce something very different from most of the docks known to us. If the Port of London could be made in all respects thoroughly up to date, I am convinced that the trade of London, with her splendid situation, would increase enormously.

That many of our docks are obviously obsolete is not to be gainsaid; but they were built long ago for a very different condition of affairs; they were destined to be outgrown. It is indeed a high tribute to the liberality of their construction, far in advance of the necessities of the day, that so many of them are still capable of highly useful service.

To have constructed docks a century or half a century ago on a scale which would have suited them to our needs to-day would have been to crush trade and the shipping industry under the weight of the charges required to make the docks remunerative. The early docks were from the necessities of the case bound to become obsolete. And in most cases it will be found better rather to provide new docks on a modern plan than to attempt to bring old dock plans up to date. They must be left to supply the modern needs of the smaller vessels, of which there is always an abundance; or, in case of need, they must be ruthlessly 'scrapped.'

Liverpool has already made solid ground once more where not long ago ships lay afloat in dock; and if the business part of London continues to grow eastwards, it will probably be no great while before the St. Katharine's Dock, now almost in

the pocket of the Tower, and cheek by jowl with the Tower Bridge, is given up to business premises.

A passing reference has already been made to the greater cheapness and productiveness of operations conducted on a large scale. The discovery is not a new one, but the general recognition of its wide applicability is now giving it the first importance, and in all sorts of directions.

Railway shareholders, impressed by American experiences, are crying out for larger trucks. Omnibuses are eclipsed by tramcars of double and more than double their capacity. The tradesman who owns three or four houses side by side pulls them down and erects one large building in their place, thus throwing into profitable use the space before taken up by party-walls, entrances to stairways, and the various domestic offices. It is, so to say, a case of two and two making five, for out of his four old houses he gains the space, or something like it, of another dwelling. And, similarly, he runs the big new premises at a great saving in labour, lighting, and general management.

But in this recognition of the advantages of size over quantity shipowners were amongst the first. To them it appealed with peculiar force, the more so since both in construction, in management and

working expenses, and in direct results, the superiority was capable of easy demonstration.

If, for example, we compare two steamers, each carrying 2,000 tons, with one steamer carrying 4,000, we find at once a great saving in cost of construction; for whereas our two vessels will cost together, say, £40,000, the single vessel of an equivalent carrying capacity will cost only £35,000. If we put it another way, the advantage becomes even more obvious, for whereas by spending £40,000 we get two steamers carrying between them 4,000 tons, for the same sum we can obtain a single vessel which will carry 4,700 tons. These data have been supplied to me by a well-known Clyde shipbuilder. And in working the one steamer instead of two, we shall effect a great saving in wages and provisions of officers and crew and engine-room staff, whilst at the same time running our engines at a considerably less cost in bunker coals and oil. Altogether a very substantial saving.

Shipowners are eminently cautious folk, and having made their discovery, they proceeded, after their judicious fashion, to feel their way gradually to its full application. The following tonnage-table of vessels from overseas to the Port of London shows this interesting process:

FOREIGN TRADE.—VESSELS WHICH ENTERED THE PORT OF LONDON IN THE YEARS MENTIONED (INCLUDING THEIR REPEATED VOYAGES).

Year.	SAILING VESSELS.		STEAMSHIPS.			TOTAL.	
	Number.	Tonnage.	Number.	Tonnage.	Average Tons.	Number.	Tonnage.
1820	* —	—	—	—	—	4,210	777,858
1830						5,178	951,729
1840						6,768	1,289,116
1850						9,914	1,904,948
1860	8,871	2,229,748	2,306	751,662	326	11,177	2,981,410
1870	7,172	2,443,693	3,837	1,645,673	429	11,009	4,089,366
1880	5,288	2,140,108	6,032	3,830,233	635	11,320	5,970,341
1885	3,343	1,405,834	7,266	5,496,821	756	10,609	6,902,655
1890	2,848	1,159,233	7,727	6,549,472	847	10,575	7,708,705
1895	2,243	958,407	7,969	7,477,269	938	10,212	8,435,676
1898	2,229	871,454	9,077	8,566,310	943	11,306	9,437,764
1901	1,960	778,323	9,457	9,214,430	974	11,417	9,992,753

* No separate records. The average of the total tonnage for 1820-1830, 1830-1840, 1840-1850, was 185, 183, 190, and 192 tons respectively.

Incidentally, it is instructive to observe how the old-time sailing vessel, or 'wind-jamber,' has been not slowly but surely ousted by the steamship, four sailing vessels to one steamer in 1860 having become in 1898 four steamers to one sailer; and the 1901 figures show the decline of the latter still unarrested. Looking at the grand total of both classes, it will be remarked how that while the tonnage in 1860 has more than trebled itself in 1901, the number of vessels composing it remains but little changed. The steady average growth of the vessels is shown in the sixth column, 326 tons in 1860 having become 974 tons in 1901.

It has already been explained that the real average is considerably in excess of these figures, the effect of the numerous voyages of the small short-trade steamers having the effect of bringing down the average of the big ocean steamers which come only once to the port while their fussy little colleagues make half a dozen or a dozen trips.

The increase in the numbers of the steamers between 1860 and 1870 is very noticeable, and again between 1870 and 1880. The opening of the Suez Canal in 1869, with the remarkable developments to which this great work gave rise, is no doubt the explanation.

The figures tabulated above are interesting from various points of view, but as illustrations of the growth in the size of individual ships they are for the reason given not entirely satisfactory. The following tonnage ladder is much more to the point. It should, however, be observed that while the table shown above relates purely to the vessels trading to the Thames, the vessels in our ladder have reference to no particular port; they are the biggest ships afloat at the date shown, and at the present time the port of the big, the very big, ships is Liverpool.

But it may be doubted whether the 20,000-ton steamer of to-day is such a popular marvel as was the 1,400-ton East Indiaman of a century ago. When 10,000-ton vessels became fairly common, our sense of size became blunted. Giant ships have, in fact, become so common that, while they continue to inspire our admiration, they have ceased to excite our wonder. The very biggest of them have rivals falling but little short of them in size, and so on all down the scale.

The 1,500-ton East Indiamen were not giants amongst tall men, but Goliaths amongst pigmies. A century ago the average tonnage was apparently 200, or perhaps rather less. The depth, or want of depth, of the Thames mattered little to such

LIST OF VESSELS SUPPOSED TO HAVE BEEN THE LARGEST IN EXISTENCE (EXCLUDING THE 'GREAT EASTERN') AT THE TIME THEY WERE BUILT.

Year.	Name.	Construc- tion.	Length (Feet).	Depth (Feet).	Gross Tons.	Owners.
1793	Warren Hastings	Wood	—	—	1,356	E. I. Co.
1811	Lowther Castle	"	—	—	1,507	"
1838	British Queen (s)	"	234	27	2,016	Brit. & Am. S. N. Co.
1843	Great Britain (s)	Iron	274	31	3,270	Gt. West. S.S. Co.
1853	Himalaya (s)	"	340	31	3,438	P. & O. S. N. Co.
1859	Seine (s)	"	331	33	3,440	Rl. Mail S. P. Co.
1862	Scotia (s)	"	379	47	3,871	Burns & McL.
1871	Egypt (s)	"	440	44	4,670	National S.S. Co.
1873	Hooper (s)	"	338	34	4,907	Hooper Tel. Works.
1874	Britannic (s)	"	455	33	5,004	Oceanic S. N. Co.
1875	City of Berlin (s)	"	488	34	5,491	Inman S.S. Co.
1881	City of Rome (s)	"	560	37	8,144	"
1889	{ City of New York (s) } City of Paris (s)	Steel	527	39	10,499	"
1893	Lucania (s)	"	601	37	12,952	Cunard S.S. Co.
1899	Oceanic (s)	"	685	44	17,274	Oceanic S. N. Co.
1900	Celtic (s)	"	681	44	20,904	"

NOTE.—The above table is for purposes of relative comparison. Standards and dates of measurement are not always the same, so that records of dimensions sometimes differ.

vessels, and if they sat on the ground at low water, this, with their small capacity and their disproportionately solid oak timbers and frames, was of no consequence at all.

Amongst such vessels the leviathans belonging to the East India Company must have excited constant wonder. The East India Dock Act of 1803, for example, begins thus: 'Whereas the ships in the employ of the East India Company are of a larger size than other vessels employed by merchants in trade, and many of them nearly equal in bulk to ships of the line in the Royal Navy . . .' These vessels were, in fact, as we gather from the Act referred to, already too big for the river, for, while the Act provided that all the East India ships should henceforth come into the special new dock, permission was given to them first to lighten into craft in Long Reach, some ten miles down stream.

To be able to enter a port and dock at any state of the tide is a privilege which a big ship can enjoy at very few places. She is very fortunate when she can dock even at half tide. But for a vessel of great value every hour lost means loss of interest, or of opportunity to be earning, in addition to increased outlay in the form of coal and stores, of crew's wages and provisions.

Consequently, when a vessel arrives off her port just so as to miss the tide, and has to anchor for a whole tide, or not far short of it, until she has enough water under her to be able to ascend the river safely to the dock entrance, the circumstance is, to say the least, annoying to her owners.

The shallower the port or river the more frequent, of course, are such delays, and the reputation of the port suffers in consequence. And if, in addition, further detention be caused by fog, the case is, of course, aggravated. Fogs we cannot help, and never shall be able to help, though possibly we may prevent their being made worse by city or cement-works smoke. But this being so, and the Thames being undoubtedly a foggy river, we ought to be all the more careful that this serious drawback, which is inevitable, is not aggravated by insufficient depth and width of the navigable channel; and there can be no doubt that in this respect the Thames has been allowed to fall behind. That the port has as yet sustained any actual injury on this account is, however, in spite of round assertions of the fact, to be somewhat doubted.

On the other hand, it can hardly be questioned that we are on the threshold of such a state of affairs. Shipowners are greatly incensed at the

delays to which their vessels are sometimes subjected, and a feeling of this kind, if allowed to grow, will sooner or later find a practical interpretation into half-a-crown per ton additional freight. And this half-a-crown, or whatever the figure may be, may in the case of certain goods easily turn the scale as regards their port of destination.

It is quite true that the ships must always come where the trade calls them, and that so long as there are mouths in London to be filled, supplies will be brought to London to fill them. But it is quite within the range of possibility that it might be cheaper to bring such supplies from a rival and more favoured port in small vessels, or even by rail, than to pay the high rate of freight demanded by a big ship, to which the delay of a shallow port means loss of money. With this grave possibility we will deal more fully when considering the growth of the Continental ports.

Western Trade Then, again, there are always goods of a certain amount shipped at A of which the destination is, in a sense, optional: they are wanted at D, and D can be supplied either through port B or port C. And if port B allows itself to be placed at a disadvantage by the greater attractions or facilities of C, then such optional goods will go to D viâ C, and not viâ B. A cheaper freight from A to C

than from A to B means that D can purchase more cheaply in the market at C than at B.

Such diversions of trade no doubt are slow, but cheapness and despatch are powerful factors in mercantile competition. I am not desiring to convey that London is, in fact, thus suffering, though quite possibly there may be some grounds for the assertions that such is the case. Such statements have, indeed, been loudly made, and though for the most part, or, indeed, entirely, unsupported by evidence, they are certainly not on that account to be laughed at.

In some few—very few—cases, big ships which have come up to the Albert Dock on the tide have, owing to special circumstances, been unable to enter the dock. The consequence was that, in order to avoid being left on the ground when the tide fell, they have had to go all the way back to Gravesend for deep water in which to wait afloat for the next tide. Such cases, as already stated, are very few; but still, they have occurred, to the great indignation of the shipowners.

When the river is deepened, as it is to be, similar occurrences will be impossible; but, until the necessary depth shall have been provided from Gravesend to the docks, it is in contemplation to provide what sailors call 'lay-bys'—that is, to

excavate sufficient of the river-bed to allow big ships, in case of need, to lie at anchor near the docks until the returning tide shall have given the needful depth on the lock sill. The difficulty will be to keep this big hole or depression clear of mud; but this, of course, will be simply a question of money.

In ancient days, when steamers were unknown, the tide was of immense advantage to vessels which, having arrived at the estuary on a favourable wind, then found themselves wind-bound. The tide came to their assistance, and carried them up towards London, either in the absence of a wind, or even against a moderate breeze. In these days of steam the wind-bound sailing vessel off the port has no difficulty in getting the assistance of a tug, whilst to the incoming steamer the tide, so far as its direction is concerned, can be disregarded—its direction, but not its height. And here it is that the depth of the navigable channel of the Thames demands attention.

2nd 1/2
Full
But first, a word on the subject of tides. As is well known, the phenomenon of the tides is mainly due to the attraction of the moon. The nearer the moon is to the earth the greater the force of its attraction. But while this influence is practically unfelt by the solid land, the sea, more mobile,

is drawn towards the moon. And as the latter makes its monthly apparent progress round our sphere, its attraction is most felt by that portion of the earth which is nearest to it. At the same time, of course, the earth is revolving on its own axis and continually presenting a fresh surface to the moon. The sun also, though in a much less degree, exerts an attraction similar to that of the moon. When the attraction of the sun and moon is simultaneously exercised in the same direction, their joint influence is shown accordingly.

The subject is very complex, and the present is obviously no attempt at its adequate treatment, but is merely by way of a general indication of the origin of tides. At new moon and full moon the tide rises much higher than at the quarters. These high tides are called spring-tides, those at the quarters being termed neap-tides.

Spring-tide has, so to say, a greater swing or range than neap; it rises higher and falls lower. When the depth—the navigable depth—of a rise is referred to as being so many feet, the measurement assumes low-water springs. Owing to the operation of the wind, or to the descent of flood waters from the land, the tide sometimes rises above high-water springs or falls below them.

*actual
heights*

But these are exceptional occurrences. The difference between high-water springs and high-water neaps varies according to situation. At Gravesend, for example, the range of high-water springs is about $18\frac{1}{2}$ feet, and high-water neaps 15 feet; at Liverpool $27\frac{1}{2}$ feet and $20\frac{1}{4}$ feet; at Glasgow $11\frac{1}{4}$ feet and $9\frac{1}{4}$ feet.

When a vessel in the course of her navigation gets aground, the condition of the tide at the time of the accident often makes all the difference as to her prospect of being salved. If she gets aground at low-water she may lift off with the tide; if at high-water, she may break her back when the supporting water ebbs. If the accident occurs on the top of a spring-tide she is said to be 'neaped,' and unless her crew can—as Mr. Weller would have put it—'assist nature' by lightening her of cargo, she must await for her release the advent of the next spring-tide.

And similarly with a shallow dock; and this is one of the troubles of the older docks at Hull. For though a ship of deep draft may enter on the top of springs, she cannot, unless in ballast, get away at high-water of the neaps.

On the shores of the wide seas the tidal rise and fall is unimportant. In narrow seas or estuaries, on the other hand, the water, being unable to

spread itself, becomes, so to say, heaped up, the heaping-up being accentuated as the shores contract. In the Bristol Channel, with its funnel shape, the compression of the water as the shores approach one another is shown by a tidal rise of some 40 feet or 50 feet, according to the situation of the port considered. In the case of the Thames, the average rise is about $14\frac{1}{2}$ feet at Southend, $16\frac{1}{2}$ feet at Gravesend, and $18\frac{1}{4}$ feet at Deptford, with a maximum of $19\frac{1}{2}$, $22\frac{1}{4}$, and 28 feet respectively.

High tide—and, of course, low tide—takes place twice in every twenty-four hours, or, rather, every twenty-four hours and fifty minutes or thereabouts. But, as already observed, it cannot always be relied upon to reach its full height, or it may, indeed, exceed it. And while such variations can ordinarily be explained more or less satisfactorily by reference to wind or other causes, there are occasions when Father Thames lends himself to eccentricities of conduct utterly inexplicable.

In this connection the following quotation from a collection of tracts forming a portion of the library of King George III., in the British Museum, reproduced in 'The World of Wonders' (Cassell and Co.), may conveniently be quoted:

'Friday, February 4th, 1641, it was high water at one of the clock at noon—a time, by reason so

accommodated for all employments of water or land, very fit to afford witness of a strange and notorious accident. After it was full high water, and that it flowed its full time, as all almanacks set down, watermen, the unquestionable prognosticators in that affair, with confidence maintain it stood a quiet, still, dead water a full hour and a half, without moving or returning in any way never so little ; yea, the watermen flung in sticks to the stream as near as they could guess, which lay in the water as upon the earth, without moving this way or that. Dishes, likewise, and wooden buckets, they set a swimming ; but it proved a stilling, for move they would not any way, by force of stream or water, so that it seemed the water was indeed asleep or dead, or had changed or borrowed the stability of the earth.

‘The watermen, not content with this evidence, would needs make the utmost of the trial, that they might report with the more boldness the truth of the matter ; and with more credible confidence they took their boats, and launched into the stream or very channel ; but the boats that lay hauled up on the shore moved as much, except when they moved their oars ; nay—a thing worthy the admiration of all men—they rowed

under the very arches, took up their oars, and slept there, or, at least, lay still an hour very near; their boats not so much as moved through any way, either upward or downward, the water seeming as plain, quiet, even and stable as a pavement under the arch. where, if anywhere in the Thames, there must be moving, by reason of the narrowness of the place. In this posture stood the water a whole hour and a half, or rather above, by the testimony of above 500 watermen on either side of the Thames, whom not to believe in this case were stupidity, not discretion. At last, when all men expected its ebb, being filled with amazement that it stood so long as hath been delivered, behold a greater wonder—a new tide comes in! A new tide with a witness. You might easily take notice of him; so loud he roared that the noise was guessed to be about Greenwich, when it was heard so, not only clearly but fearfully to the bridge; and up he comes, tumbling, roaring, and foaming in that furious manner that it was horror unto all that beheld it. And as it gave sufficient notice to the ear of its coming, so it left sufficient satisfaction to the eye that it was now come, having raised the water four foot higher than the first tide had done—four foot by rule, as by evident measure did

appear, and presently ebbed in as hasty, confused unaccustomed manner. See here, reader! a wonder that, all things considered, the oldest man never saw or heard of the like.'

While the growth of London's trade during the last half-century has been remarkable, even more remarkable is the development which during the same period has been collectively displayed by the Continental ports. London has always been the premier port, and as such is naturally sure of the lion's share of Europe's increasing trade. But so great was the increase of this trade that, if it did not create actually new Continental ports, it certainly gave to old ports a new importance.

It was attributable to various causes. In our own case the long period of peace which preceded and followed the Crimean War was a potent factor. For whereas early in the century the taxes or duties on imported goods were general and heavy, as the effects of peace began to be asserted these duties were lightened and in many cases removed altogether. The result was a large growth in consumption. Then, as the general prosperity of the country advanced, and money became more and more plentiful, individual consumption was further increased by enhanced ability to purchase. The national prosperity increased enormously, so

that not only were necessities purchased on a much more liberal scale, but articles of importation which at one time were regarded as luxuries for the fortunate few, came to be classed amongst the common necessities.

And not only were supplies cheapened by the reduction or removal of duties, but the employment of iron-built steamships, with their rapid and regular voyages, resulted in a lowering of freight and insurance charges, and the elimination of heavy warehousing expenses, which this rapidity and regularity rendered no longer necessary.

Sailing vessels had often their regular trading seasons, and were given to arriving, on a favourable wind, in fleets, and in times of war in fleets under convoy. The markets were in consequence often over-supplied, and cargoes had to be placed in warehouses, and kept there often at astonishingly high rates of rental and insurance, until the consumers required them. The table on p. 66 shows how the old-time sailing vessel was gradually displaced by steam; but while we have no statistics to demonstrate the effect of the altered conditions on the pocket of the consumer, there can be no doubt that the amount of the supplies which individually he became able to purchase for a given sum was very largely increased.

The economic history of the nineteenth century is indeed a history of supplies at a steadily decreasing cost, of a reduction of duties, with the effect of still greater cheapness to the consumer, and of a prosperity which, by rendering money more plentiful, increased the power to purchase. And the increasing demand resulted in the opening up of new areas of supply, with the further reduction in values consequent on competition amongst the producers. So far as labour—at any rate in towns—is concerned, the steady growth of wages during the past quarter of a century is common knowledge. The effect of all these co-operating causes is well illustrated by the example of tea—‘the drug tea,’ as Adam Smith terms it. Thus:

	1800.	1860.	1879.	1889.	1896.
Market price	4s.	3s.	1s. 8 $\frac{3}{4}$ d.	1s. 4 $\frac{3}{4}$ d.	1s. 1 $\frac{1}{2}$ d.
Consumption per head -	1 $\frac{1}{3}$ lb.	2 $\frac{2}{3}$ lb.	4 $\frac{3}{4}$ lb.	5 lb.	5 $\frac{3}{4}$ lb.
Duty (included in market price) -	30%	1s. 5d.	6d.	6d.	4d.

And with sugar the story is much the same. In 1800 the duty was 11s. 7d. per cwt., in 1860 14s. 2d., and in 1874 it was repealed altogether,

the result being that a consumption of 18 pounds per head in 1800 advanced to 82 pounds per head in 1896. The consumption of imported wheat and flour per head of population in 1800 was 35 pounds; in 1896 it was 255 pounds. As the consequence of the Transvaal War, a duty on sugar has been reimposed, but for present purposes the earlier figures afford a more convenient illustration. Mr. Sauerbeck's statistical tables are also very much to the point. Adopting as a par basis of 100 the average of the prices prevailing during the period 1867-1877, and comparing with this basis the prices prevailing during recent years, his tables furnish us with this instructive result:

	Vegetable Foods (Corn, etc.).	Animal Foods (Meat, etc.).	Sugar, Coffee, Tea.	Average.	Minerals, Textiles, etc. Average.
	£	£	£	£	£
1867-1877 -	100	100	100	100	100
1879 - -	87	94	87	90	83
1889 - -	65	86	75	75	72
1898 - -	67	77	51	68	64
Average: -					
1878-1887 -	79	95	76	84	79
1888-1897 -	62	81	66	70	67

So that corn, etc., which between 1867 and 1877 cost £100, now costs—or cost in 1898—only £67; meat, instead of £100, £77; sugar, coffee

and tea, £51; clothing, etc., £64. And, of course, it is to be remembered that the £100 basis of 1867-1877 must already be in probably every case far below the actual figures of years earlier in the century. And doubtless wages-incomes will be found to have increased on something like the inverse ratio.

Figures such as these would of themselves account for a vast increase of consumption, and therefore of importation, even if the population had remained stationary. But far from remaining stationary, the population of the United Kingdom has during the century increased from 17,000,000 to 40,000,000, and with it, of course, the four-footed population, all of which requires to be fed. Roughly, the consumption per head, as shown above, increased five-fold in the century. The population also increased twice and a half times, so that on these figures the trade of the Port of London will in the century have increased apparently, in the case of the articles mentioned, no less than 1,250 per cent.—that is, $12\frac{1}{2}$ pounds consumed in 1900 for every 1 pound in 1800. The tonnage increase shown by our table on p. 66 is in singular coincidence with this increase, the figures for 1820 having multiplied themselves some thirteen times.

In these figures we have, of course, been dealing with the subject of England's increased consumption only on broad lines—and not, also of course, with any thought of glorifying London—in order to lead up to a consideration of the no less extraordinary growth of the trade of rival ports across the narrow seas. For this prosperity and development and growth of population has not been the peculiar privilege of England.

In Germany and the Low Countries similar influences have been at work, with, in the case of Germany, an industrial development which is patent to all the world. The conclusion of the Franco-Prussian War, with its indemnity of £200,000,000 of French gold to the victors, and the confederation of the various German States was the commencement of a new era for the latter. Just previously had occurred the successful opening of the Suez Canal, followed by a rapid development of steam traffic.

Competition amongst shipowners and merchants grew apace. Antwerp, by the abolition of the Scheldt dues in 1863, had already begun to attract a trade of her own. Like Rotterdam, the port was a conduit-pipe for the German hinterland, and the competition between these ports led to the rapid development of both. But Germany, with

her growing trade, wanted a good port of her own, and the Free State of Hamburg set to work to deepen the Elbe and to improve the accommodation of the port.

For the former conditions had entirely changed. Time was when Germany had no use for big shiploads of cargo, even if the ships themselves could get up to her ports. To a large extent London had been the German market. The big shiploads came to London and were there transferred to smaller vessels for the ports of Northern Europe. With Germany's increased and increasing powers of consumption, she was now in a position to order shiploads for herself.

The experiment was tried and was successful. Cargoes through the new canal were carried past the entrance to the Thames, both for Hamburg and for Bremerhaven direct, and for Antwerp and for Rotterdam.

Genoa and Trieste, too, were found to possess great advantages: the Suez Canal had brought them near to the sources of supply, and had made them independent of London. The following figures are interesting testimony of the altered conditions as regards our neighbours' powers of consumption:

	POPULATION.		
	German Empire.	Belgium.	Holland.
1829 -	—	—	2,613,000
1831 -	—	3,785,000	—
1850 -	—	4,426,000	—
1870 -	40,818,000	—	—
1873 -	—	5,253,000	—
1878 -	—	—	3,981,000
1899 -	—	6,744,000	—
1900 -	56,367,000 (including 1,717,000 Alsace-Lorraine).	—	5,104,000

Between 1825 and 1900 the population of the various States now combined in the German Empire is stated to have doubled itself, while between 1871 and 1895 that of the large towns increased no less than 269 per cent. So that with these vast increases on the one hand, and a doubtless much enhanced individual prosperity on the other, our neighbours might well create a trade of their own. All the more so, with the greater cheapness and abundance of supplies resulting from the opening up of new sources of production, increased competition amongst producers, and reduction of freights and charges consequent on an immense development of steam navigation.

It is submitted that in the circumstances above

narrated the history of the growth and development of the Continental ports amply explains itself, and that there is no need to look further for reasons.

The assertion, indeed, that the growth of our overseas rivals is to be attributed to London's deficiencies is equally misleading and incapable of proof. It is one of the many wild statements incidental to the heated controversy on the conditions of the Port of London. The contention of the adversaries of the dock companies has been that the charges and exactions of the companies have been so oppressive that trade has been driven from the Port. I believe the statement to be absolutely unfounded, and propose presently to return to the circumstances in which it has arisen.

Trade, no doubt, does now go direct to Continental ports which used to come to us, and no doubt it will increasingly continue to do so. The more the population and the potential wealth of the Continent increase, the more will the ports of the Continent be directly resorted to; and it may well be—nay, it must almost certainly happen—that unless we can maintain the Port of London at the highest state of efficiency and, no doubt, cheapness, we shall have the tables turned

on us : we shall have the big cargo-carriers going direct to the Continent and the Continent sending goods to us.

To some extent this must always happen. What we have to do—and we shall have to strain every nerve to do it—is to prevent its occurring on a disproportionate scale. In case such a view should be regarded as unduly alarmist, let us look existing facts in the face.

No doubt much Argentine and Australian wool, many South American and Eastern hides, and so forth, do now reach us *viâ* the Continent. As such products have, however, also a Continental origin, it is not easy to distinguish their source. Let us take, then, as our text or test, articles of consumption which have only a distant origin—articles such as coffee, tea, rice, and such like; and here the Blue-Book returns are plain and incontrovertible.

Well, in 1901 we received from Germany, Holland, Belgium, and France, 158,551 cwt. of coffee valued at £623,662; of tea, from Holland, 6,875,584 pounds, valued at £214,982; pepper, from Holland—but possibly this is a Dutch privileged trade—1,847,064 pounds, or £46,277; rice, from Germany, Holland, and Belgium, 677,743 cwt., or £385,440; palm oil, from Germany alone, 204,422 cwt., or £245,572.

Huge German vessels and Dutch and Japanese vessels of great capacity—and, for that matter, British vessels just as readily—contract to carry cargoes home to Continental ports, and portions of what they bring are transhipped to short-voyage steamers for London, Hull, Leith, and numerous other English ports.

We, of course, return the compliment, and on a much larger scale, but no longer on the former basis of proportion. This is undoubtedly a fact; but, as already stated, and as seems sufficiently obvious, the explanation is not the dearness or defects of London. Nor is it a fact which is reflected or indicated, so far as I am aware, by any decline in London's direct trade.

We have, however, obviously arrived at a most critical epoch in the history of the port. For while our population's need of foreign produce is bound to be supplied, failing the most strenuous efforts on our part not only to retrieve the mistakes and neglect of the past, but to put the Port of London even in advance of the needs of the present, we may find these supplies coming to us more and more largely from Continental ports. I do not wish to write as an alarmist, but I cannot express too forcibly or clearly my firm conviction that the present conjunction is one which demands our

united and most strenuous efforts in order to avert the danger which we have been considering.

Let us now turn from our review of the circumstances which have brought our Continental rivals so much to the front to a reference to the causes which have led to the present outcry against the condition of the great Thames port.

Perhaps the best way to set about it will be to begin at the beginning—that is, at the time when London had no docks at all. We have already seen how a century ago, and earlier, the port was blocked with fleets of Newcastle colliers. These vessels all lay in the stream, or, at low-tide, on its shores, and discharged into barges, and no doubt at low-water into the city's carts. For many weeks at a time, when the wind blew strongly from our coast, they would have the river, except for outward loading vessels, to themselves. Meantime, a growing fleet of wind-bound vessels in the Downs awaited the longed-for change of wind, on its happening with one accord to up-anchor and make sail for London.

Or in times of war—and they were frequent in those days—a convoy of Indiamen or from some West Indian rendezvous would arrive, and what with colliers and with argosies the river would be blocked. And not only was the river blocked with

shipping, but so great was the congestion that in the absence of storage valuable cargoes were kept for weeks in barges or piled up on the shore. Pillage on a wholesale scale was carried on, and complaints were loud and bitter. And not merely by the merchants, but by the Customs, for so great was the plundering and the speculation that, in those days' when scarcely anything was duty free, even the national pocket was affected. Towards the close of the eighteenth century the West India merchants alone set their losses by pillage at £150,000 a year, with an additional loss of £50,000 to the revenue.

The City decided that at all costs warehouses must be provided, and a protected dock from which the thieving bands could be excluded.

It was decided by the West India merchants to obtain a dock site on the Isle of Dogs, and Parliament was approached accordingly. But here a serious difficulty arose. There were many owners of legal quays or sufferance wharves engaged as warehousemen in the West India trade, and they objected, naturally enough, to a dock monopoly which would compel every West India vessel to enter the new dock; for without this monopoly the dock promoters declined to proceed.

Eventually the wharfingers were bought out. In 1799 the West India Dock Act was passed for the West India trade, followed next year by the London Dock Act, under which vessels not from the Indies bringing tobacco, rice, wine, and brandy were obliged to enter the London Dock.

Then, in 1803, came the East India Dock, with its monopoly of the East India trade and compensation to the wharfingers as in the previous cases. These monopolies were in each case for twenty-one years, and they expired in 1823, 1826, and 1827.

The exact sum paid, in the aggregate, to the wharfingers I have been unable to ascertain. About seventy years ago the figure seems to have been regarded as £1,000,000, but in a pamphlet of that period it is stated that the sum paid was £2,000,000 as against £5,000,000 claimed. The difference between these figures is considerable, but it does not seem to matter much to-day which of them, if either, is correct. The point is that the wharfingers were bought out for twenty-one years.

But there was another difficulty—the barge-owners or lightermen. They had been able to come alongside vessels in the river and carry their cargoes wherever they were needed: what was to

become of them? And if the lighterman of those days was like the lighterman of to-day we may assume that he did not take it either lying down or silently. Apparently the lightermen were also compensated, but this at any rate is certain: they got conferred upon themselves the right to carry goods to and from the ships in the docks without any liability for dock dues on craft or goods. The docks during the currency of the monopoly, while receiving tonnage dues from the ships, were to the lightermen to be 'free water'—as free as the river—and a clause was inserted in the Dock Acts and in all subsequent Dock Acts in that sense.

This is known as the 'free water' or 'exemption' clause, and on it hangs the whole history of the present troubles of the port—of the port, that is to say, as distinguished from the river.

It has already been explained that the main object of the promotion of the first docks was the warehousing of cargoes. The undertakings were a huge success, the dock companies making such large profits out of the goods that, more especially when the time came when the docks were brought into competition with one another, they let off the ships very cheaply. What they wanted was the cargoes.

When at the termination of the twenty-one

years the monopolies came to an end and the ships could please themselves which dock they used or whether they should use any at all, a Parliamentary Committee reported against renewal of the monopolies, and there ensued something like a rush to build new docks. Some of the proposed docks were built, some not, and some of the former were in course of time merged with similar undertakings.

As time went on, and peace and prosperity were the country's happy lot, duties were taken off right and left, and goods which had formerly to go into bonded stores mainly at the docks could be warehoused in any licensed stores. Wharves and warehouses sprang up along the banks, and a steady competition set in between them and the docks and between the various docks themselves. The ships entered the docks much as before, but the wharfingers sent in their lighters and took goods from the dock waters to their own stores.

The dock companies, alarmed at the consequent decline in their own profits, appealed to Parliament in 1855 for the abolition of the free-water clause. They were, however, still making good profits, and Parliament threw out the Bill. Matters steadily grew worse for the docks, in no small degree aggravated by the competition

between the two great companies themselves—the East and West India Dock Company and the London and St. Katharine Docks Company. Whichever of them could get the ships got the cargo which the lighters did not carry to the wharves, and both companies became more than ever subservient and conciliatory to the owners of the ships.

In 1880 the London and St. Katharine Company played a trump card. It opened a splendid new dock—the Royal Albert Dock—which at once drew shipping from the rival company. A fierce war of rates naturally ensued, to the prejudice of the finances of both companies. The East and West India Company then determined to ‘go one better,’ and to build a still finer dock opposite Gravesend—the Tilbury Dock.

It was a reckless undertaking recklessly entered upon. It never seemed to occur to the company that to build a dock is not an operation necessarily attended by the creation of ships to fill it; and that for years, until a vast growth had taken place in the tonnage of the port, the new dock could only be filled by drawing ships both from the company’s other docks and from the docks of the rival companies; and that this latter process would inevitably be attended by a fierce war of rates.

And to make matters worse the cost of the new dock at Tilbury proved to have been grossly underestimated. It was to have cost £1,100,000; it *did* cost £2,800,000.

No doubt there was extravagance, and harsher things than this are said; but the bulk of the mistake was rather in the estimate than in the cost, and it is asserted, quite possibly with truth, that such a dock could not now be built for equal money.

Bitter critics of the dock company maintain that the excess of cost over estimate was thrown away or worse; but as a comment on this it may be remarked that the cost of the Albert Dock and basin, which have a water area of 88 acres and a depth of 27 feet, was about £2,250,000, and that the area of Tilbury Dock and tidal basin is 73 acres, with a depth of as much as 38 feet.

This, however, by the way. The fact remains that as the result of all this reckless competition the two great dock companies were brought to the verge of ruin. In fact, while the London and St. Katharine Company's ordinary stockholders had to content themselves with a bare pittance, the East and West India Company's income dropped in 1887 to a figure below the amount due even to the privileged shareholders; and in

1888 the latter entered upon liquidation proceedings. These proceedings were stayed owing to the operation of a technicality, the East and West India Company thus narrowly escaping the catastrophe of a liquidation.

A cessation of the war of rates was at this stage arranged, and a working union between the two companies was arrived at. The companies were, however, not financially amalgamated, and the two boards of management, though in minor matters working together, took different views on certain matters of high policy.

These differences were, however, in 1900, merged by the financial consolidation of the two companies under the name of the London and India Joint Docks Company, and the new company took off its coat to effect changes in the earning powers of the joint undertaking.

These efforts and the hubbub they created amongst the merchants and the wharfingers, already greatly excited at previous similar attempts, brought affairs to a climax. The Dock Companies' Bill applying for increased powers was set aside in favour of inquiry by a Royal Commission, which was appointed in June, 1900, and commenced to take evidence in the following November.

Under the very able chairmanship of Lord

Revelstoke, the complicated subject was dealt with in a manner and with a promptitude eminently creditable to the Commission. Their very compendious yet exhaustive report was issued in June, 1902, and the essential recommendations of this report are now before Parliament in the form of a Government measure. Its sum and substance is that the various public dock companies, together with the Lower River duties of the Thames Conservancy, shall be taken over and adopted by a public trust in the interests of the port, the trust to be empowered to obtain the needful funds by port dues on every package which enters the Thames, in the Liverpool fashion. Till now, London has collected no port dues on cargo. The Bill is generally admitted to be sound in principle, but its fate in Parliament, in view of the difficulties to be faced, remains uncertain.

But now, a few words on the dock companies' proposals which caused the hubbub, and on the circumstances in which they were determined on. We have already seen how the wharfingers, with the special inducements and facilities afforded by their various systems, have long been depriving the docks of the cargoes brought to them. So serious has grown this drain on the profit-earning

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power of the dock companies that at the present time between 75 and 80 per cent. of the goods which the ships bring to the docks are taken away to the wharves, while goods for shipment are brought to the docks by water in about the same proportion.

As neither the barges nor the goods carried by them pay any dock dues—the ‘free-water’ clause—it is easy to see that the docks, under such a system, must needs be under serious prejudice.

But over and above this, the docks have long been suffering under the effects of what is known as ‘the custom of the port,’ which is really a sort of incident of the ‘free water’ clause. Now, in Liverpool, for example, the shipowner has fulfilled his carriage contract, and done with the goods carried, when he lands them on the dock quay. It is then for the merchants to sort the goods and take delivery at their own expense—we may call it, say, 1s. 6d. to 2s. a ton. The shipowner gets his ship emptied with the utmost despatch, and is ready to proceed to his loading-berth without delay. ‘Prompt despatch’ to a shipowner, whose interest on outlay, wages and provisions runs on all the time, is the very essence of success. The facilities which the Mersey Dock

and Harbour Board have provided in order to secure this for him are very costly, and Liverpool is in consequence by no means a cheap port for shipowners. But of this they do not complain; what they want before anything is 'prompt despatch,' and they are very willing to pay for it.

The 'custom of the port' in London is equally prejudicial to the docks and to the shipowners. It is this: that the ship shall sort the cargo for delivery, and give this delivery either on the quay or into craft as may be demanded. And, as we have already seen, practically four-fifths of the goods go away in lighters.

The effect on the shipowners is that, first of all, they have to bear the 1s. 6d. or 2s. per ton for sorting—if the goods be sorted: a whole cargo of grain or seed may require no sorting—which charge in Liverpool falls on the merchants.

Next, and even more serious, the system entails great delay—an utter want of 'prompt despatch.' And for this reason: Ships nowadays—as we shall presently see—carry such vast cargoes that to hustle a mixed cargo out on the quay and sort it then and there is impossible. No ordinary quay and shed, especially if provided for the needs of a quarter of a century ago, is big enough.

The result is, in London, that the quays get

blocked and the discharge is impeded. Where delivery can be given overside direct into craft this is done ; but with mixed cargoes it is impracticable : the goods must be put in the quay sheds, to be sorted at the expense, as already explained, of the *ship*. Meantime the lighters are crowding the dock waiting for their load, and perhaps before they can get it another vessel takes the place of the former at the quay, which becomes hopelessly congested. Delivery of the cargo is delayed, barges are delayed, and the ships are delayed, and great is the outcry in consequence.

Naturally, London is unpopular with shipowners. Big ships, to which of all others despatch is essential, are kept waiting for the tide ; when they get into dock they are hampered in their discharge, and, over and above all this, have to pay for sorting out the cargo. With shipowners especially 'time is money,' and bad despatch and extra cargo charges in London combine to give the port a bad name ; by common consent, it is 'a dear port.'

But not, be it well observed, for cargo. Not only do consignees who claim water-delivery—nearly 80 per cent. of the whole cargo—escape, by the custom of the port, the sorting charges, but their goods pay not a penny for dues. The

wharfingers send their own lighters for the goods, and until these are delivered at the wharf the charges do not begin.

It will be seen, therefore, that for cargo London is a remarkably cheap port. At any rate, this is so as regards three-fourths or four-fifths of the goods. It would not be surprising if on the small remainder the docks charged stiffly, but against this there is always the countervailing competition of the wharfingers. For merchants can take or send their goods where they please, and if the docks charged overmuch, the wharves would soon bring them to their bearings.

The above remarks originated in the intention to show how the 'custom of the port,' over and above the 'free water' clause, prejudices the docks. The custom deprives the docks, in effect, of the opportunity to make a profit on the sorting of the cargoes; for while 'bulk' cargoes such as grain or seed are delivered overside into craft, the miscellaneous cargoes which are landed on the quays are sorted by the shipowners. True, the latter pay the dock company a rent for the sorting-space, but if the dock companies had the handling of the goods the yield would be much more than the rent of the quay or shed area.

Rent
of
Shed

An attempt by the dock companies a few years

ago to get this matter put on a basis more satisfactory to themselves set the port in an uproar ; and though the shipowners would gladly have supported the dock companies, their relations with the consignees compelled them to side with the latter. The dock companies—this was before their final amalgamation—allowed themselves to be ‘bluffed’ with the threat of a new dock, and gave in, the shipowners offering them a golden bridge, or what the French call a ‘perch,’ by which to climb down in the form of some unimportant addition to the quay-rent, or something of the sort.

The dock companies’ attempt, however, greatly excited the produce merchants and their supporters, and the rapacity and mismanagement of the docks were fiercely assailed. ‘London was the dearest and worst-managed port in the world’; ‘the dock companies were driving away the trade of the port’; ‘Hamburg and Antwerp were prospering by reason of our defects’; ‘the history of the docks was a history of mismanagement, culminating with their ghastly mistake at Tilbury’; ‘the capital of the companies was twice too big, and the merchants were to be sweated to provide dividends’; and so on and so on, it being a case of ‘any stick to beat a dock with.’

No doubt in the history of the dock companies, as in the history of other undertakings, there has been mismanagement, but no amount of good management could fight successfully against the 'free water' clause and the 'custom of the port,' in the now altered conditions; and it is these, and it may be said only these, which have brought the docks into their present—or perhaps it should rather be said recent—impecuniousness. Recent rather than present because, a little more than a year ago, the Joint Dock Company, at their wits' end for money, put up the tonnage dues on shipping from 1s. to 1s. 6d., the statutory maximum, with the result of an increased revenue of about £100,000 a year. They have also, greatly to the exasperation of the wharfingers and lightermen, taken a stand on their legal rights in directions affecting these latter, so that, all round, the finances of the dock company are in a greatly improved position, a fact which is reflected in the prices of the company's various stocks.

As regards the increase on the tonnage dues on shipping, it may be observed that the charge is only 2d. more than that which has long been in force at Liverpool, and if shipowners got the equivalent in prompt despatch, they would probably not complain—or shall we say rather, would not

really feel aggrieved? When, however, we remember that this extra 6d. leaves their losses by delay in the river and in the docks precisely *as* they were, it is impossible to regard the addition other than seriously. In the interests of the good name of the port it is greatly to be deplored. But the dock company were bound to get money somehow, and if the doors to all other means were slammed in their face, they must needs exercise the powers conferred upon them against the ships.

Up to this time, recognising as they did how severely the ships were already hit by the 'custom of the port,' which saddled them with sorting-charges, they had studiously refrained from anything which would add to the burden on ships. But there must be a limit to all things; and the company could not indefinitely allow their stockholders to be starved, and the docks themselves deprived of funds for improvements, merely because of a recognition of the hard case of the shipowners. Still, the extra 6d. is to be greatly regretted.

I hold, myself, strongly to the opinion that the sound policy in the interests of a port is to make it as attractive as possible to the shipping. For shipowners will not consent indefinitely to be unduly taxed, under whatever head or heads, and the day when they decide to add 2s. 6d. a ton to their

freight to any particular port will be a bad day for the port. Funds must, of course, be provided for the up-keep and development of the port, but in the interests of the reputation of the port amongst shipowners, the levy should be so far as possible on goods, and not on the facilities of their conveyance. And to the consumers and to the port treasury it comes to much the same thing, whether the dues be derived from the ships, or from the cargoes, or from both. For example, say a ship of 4,000 tons brings to the port a cargo of 4,000 tons, and that the tonnage dues are 1s. per ton on the ship tonnage, and 1s. per ton on the goods. The cargo-owners pay their 1s. to the port authorities, and they also pay the ship's shilling in the form of extra freight; for, naturally, the shipowners include the tonnage dues when deciding on the freight. Competition between shipowners is exceedingly keen, and if they had not to pay the 1s. tonnage due they would charge a freight which did not include it; so that the merchants, if paying 2s. cargo dues instead of 1s., would, or at any rate should, on the other hand, pay a freight in which the ship's 1s. was not included.

It is not here being argued that ships should at once be port-free, though I am not at all sure that this would not be sound policy; but certainly

it is submitted that ship charges should be made as low as possible, in order to make the port attractive to shipowners. And this is doubly necessary in the case of a port like London, which only to a limited extent offers to incoming ships the prospect of an outward cargo. For it is by no means to the advantage of a port that ships which have arrived with cargoes should have to go away in ballast in search of an outward cargo. The port which, other things being equal, presents the greatest attraction to shipowners is the port at which they can count on getting an outward cargo on completing discharge.

So much has here been said about the size of modern ships and the difficulty of delivering their cargoes that it may be well to have a better understanding of the subject. A ship afloat, especially a laden ship, gives but a small idea of her real capacity. The appearance of big ships, high and dry on the land, as one may see them any day on the banks of the Clyde, is a revelation. Towering high above the stream on either bank, uprising in a bulk and vastness amazing to behold, sometimes ranging three or four abreast, stand these mighty monuments of the Clyde's proud industry, some of them apparently awaiting the signal for their plunge from off the ways, others in their gaunt and

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earlier stage of ribs and beams and frames, but all alike stupendous and impressive.

And their carrying capacity is even greater than their appearance indicates. Take, for example, a cargo steamer of 8,000 tons gross register, though there are afloat many vessels of greater, some of much greater, measurement. In fact, of vessels above even 10,000 gross tons there are now* 74, of which 35 are British, 25 German, 8 American, 4 Dutch, and 2 French. Now, an ordinary cargo steamer carries, roughly, half as much again as her gross register, so that our ship will carry some 12,000 tons. Now let us see what this means in railway-truck loads. At 8 tons to the truck, 1,500 truck loads. Anyone who will take the trouble to observe the goods-trains as they jolt and bump slowly past the platform on which he is waiting will come to the conclusion that a train of thirty trucks is fully up to the average length, and in fact beyond it. He will also notice that many of the trucks are by no means fully laden. Let us, however, assume that each truck is, in fact, fully loaded. This gives us 240 tons to the train, or 50 goods-trains of 30 trucks each to move the cargo of our 8,000-ton ship.

Let us now look at it longitudinally. The average length of a goods-truck, as the naturalists

* *I.e.*, August, 1903.

express it, from nose to tail, is 6 yards, so that our train of trucks will be 9,000 yards long, rather more than 5 miles, to which we may add, if we put our 50 trains in a line, another 600 yards for 100 break-vans, without engines and tenders, a total length of $5\frac{1}{2}$ miles, or a 3s. cab-fare,—legal fare. Such a cargo in a single vessel of not very extraordinary tonnage is stupendous, but inasmuch as it has been attained to by gradual process, we regard it, after our fashion, as reasonable and commonplace, even if we think about it at all. None the less, it is stupendous.

As to its value, this will, of course, depend on the nature of the cargo. If it should consist largely of tea, silk, spices, and rubber, and such-like valuable stuff, it may easily run into half a million of money. At a very moderate estimate it will be worth not less than £120,000. As to the vessel herself, £10 a ton, or £80,000, will probably be well within the mark. In the case of a passenger steamer £40 a ton, or £320,000, will not be out of the way; but, then, with a passenger steamer you get much less cargo space. On the other hand, the cargo carried is ordinarily especially valuable. Now, here we have in dock a costly vessel, every hour at expense in interest on outlay, in wages and provisions, and in lost earning-opportunity. What

000. Ton
and.

wonder, then, if her owners are impatient of delay, of 'slow despatch,' especially if she shall already have been detained by insufficient water or by fog. But how to get this 12,000 tons of cargo out of her with expedition?

It is, in fact, a colossal task if despatch is to come into it; and, be the ship's own hoists and gear, and be the quay cranes and the dock tackle what they may, a colossal task it will remain. And the more miscellaneous the cargo the more the delay of sorting and classifying. When the cargo happens to be all grain, or all seed, or all cotton or jute, the process is much simpler. But these are the kinds of cargoes which find their way more especially to the northern ports; mixed cargoes, for consumption and distribution, come mainly to London, with her own vast population and that of her off-swarmed cities.

The mere emptying of the ship is a huge task, but the real difficulty is to give shore clearance. In this respect Liverpool is remarkably successful. Let us observe the process, common in its initial stages to all ports alike. The ship has four or five hatches, and will discharge from all simultaneously. Every vessel nowadays carries her own cargo booms and hoists, which are ordinarily pivoted on the mast. The hatches having been

Shore
clearance

removed, and the booms rigged and connected with the ship's donkey-engines, the chains drop into the hold, the labourers waiting there collect a sling of packages, hook on the chain and give the sign, and up goes the load. Ordinarily, this is deposited on deck. It is generally not convenient to swing the booms so as to land the sling-load on the quay, though this may be done. From the deck the goods may be slid down a shoot to the quay, or they may be carried ashore, or a shore-crane may drop its chain on to the deck and transfer the load bodily to the quay, whilst the ship's tackle is being again lowered for another load from the hold.

From the quay the packages are carried or trollied into the shed, there to be grouped and sorted. But how to find room for them all? Packages can no doubt be stowed in tiers; but this means time and money, the two very things that have to be economized. And then it must be remembered that while we are contemplating the case of a single vessel, two or three, or even half a dozen, vessels may arrive together, and each in the same tearing haste to get rid of its cargo and make ready for a new voyage. It will be seen, therefore, how the ships are at the mercy of the docks, and how disadvantageous are the London delays,

greatly accentuated by the barge system—in itself full of advantages—which predominates in London and is altogether absent from Liverpool. And even if you have the room for sheds of vast size, with waggon-ways, and even truck-lines through them, the difficulty is rather varied than removed; for cargo in sheds has to be moved by hand, and the hand-trucking of many thousands of packages across a very wide floor means money.

And this is where Liverpool has distinguished herself, Bremen and Copenhagen having also promptly profited by her example—at any rate, in principle. Liverpool has built sheds of more than one story, with a flat roof, and crane-rails and cranes along it on the water-front. While, therefore, the ship's hoists and the shore cranes are busily at work, the shed cranes, high in air, drop their chains also into the holds, and swing their loads to the upper sills, so that a double despatch is thus provided. Then, when the cargo has to be got away, it is lowered by cat's-head cranes from the upper sills to the trucks or carts below on the landward side. These two-story crane-carrying sheds are, of course, very costly to build; but in docks and shipping there is no economy like the economy of despatch. It is cheap at almost any price.

It may here be observed that Glasgow has experimentally copied Liverpool in the matter of the double sheds, but, by contenting herself with the ordinary quay cranes, instead of building solid sheds and putting the cranes also on the roof, she has missed the point, and failed in affording the greatly increased despatch at which she aimed.

In the discharging of grain, as in the loading of coal, by a gradual process of experiment and invention, a system or systems have been arrived at which, if not perfection, are all that is needed. The discharge of a cargo of grain in bulk by endless bands or by centrifugal pumps gives a rapidity of transfer from ship to shore which leaves nothing to be desired. The centrifugal pump draws the grain out of the hold just as the dredger-pump draws the sand from the river or ocean bed. As to the endless band, its use also depends on an adoption of the methods of the dredger—the bucket-ladder dredger. From the ship to the shore runs a wide, endless band, revolving rapidly. The band runs between supports or guides, which tip it up at the sides into a convex shape. As the band travels, an endless chain of little buckets dips into and emerges from the hold, each bucket in turn shooting out its load on to the moving band. The grain is borne along the band,

and shot in a steady stream into the dock shed, or silo, or elevator, or transferred to another endless band, or system of bands, which delivers it at any point required. It is an interesting process. If it ends in a dock shed you may see the conical heap grow bigger and bigger, higher and higher, with a constant trickling of the grain down its sloping sides—in fact, it is the hour-glass process on a splendid scale. Said a Liverpool dock ‘overlooker’ to me once, as I watched the steady growing of such a heap: ‘Ah! there’s a difference from old days, sir. Then it all had to be carried ashore on men’s backs. You’d see a string of men, one after the other, staggering up a plank to shoot their load, with their eyes blazing out of their heads.’

So also, in the matter of despatch, with the loading of coal as cargo. A train of trucks comes alongside the ship, and a mighty crane picks up truck after truck, swings it into the air, and lowers it into the hold, where the end-board pins are knocked out, and the coal shot on to the growing bulk. But even this is already becoming old-fashioned.

The approved plan is as follows: A double line of rails, on a lofty platform, is carried to a stage beneath which lies the ship. One by one the trucks send their contents down the shoot into

the hold, and the empty truck then, of its own weight, runs down the inclined return-rails to join its empty fellows. Or the train comes underneath a hydraulic tower, which rapidly lifts truck after truck to the sloping platform, there to shoot its load into the ship, and to be returned, by the hydraulic lift, or by a sloping line, to join the lengthening train of empties. The rapidity with which this process can be completed is very notable. It is mentioned, for example, in the *Trade Review* of Hull for 1902 that in one case recently 4,969 tons—say 600 truck-loads—of coal were shipped by one steamer in twenty-four hours, and probably the returns of other ports would show this result to be far from exceptional.

It may be well to remember that to load a coal cargo and to fill a steamer's own private coal cellars, or 'bunkers,' as they are called, are two very different things. To 'bunker' a ship, coals have ordinarily to be carried on board in baskets, and conveyed by shoot or carried to the particular spot where they are required. Bunkers are often very inconveniently placed, and great care has to be taken in coaling an empty vessel, to keep her on an even trim, for want of precaution in this respect may easily cause, and several times has caused, the vessel to capsize and sink.

It is just as well to comment on the distinction between 'bunkering' and 'loading' a ship, because, when the troops were going on board the transports in London, certain newspaper correspondents, who had seen coal *cargoes* shipped at Cardiff or Newcastle, were aghast at the antediluvian methods, as they described them, still in use in London—coal hoisted or carried on board from a barge alongside, a basket at a time! They could not restrain their astonishment at methods so antiquated. No doubt improvements could be made in the arrangement of, and method of, getting at a steamer's bunkers, but, as matters now stand, a laborious system of filling a steamer's bunkers is ordinarily inevitable. It is not a question of port-system at all, but of ship construction. And absurd, antiquated, and expensive as may seem this process of coaling a steamer by baskets or skips, and great as may be the waste by dropping of the coal into the water in the process, that it should be carried on in London—and elsewhere—is certainly no sign of port-decadence.

Before finally leaving the docks a few words should be said on London's barges. As to the antiquated monopoly and privileges of the Watermen's Society, now to be abolished, or, as it is cuphuistically expressed, 'taken over' by the Port

Trust, we can pass them by. There are in London about 11,100 barges registered with the Society, and 500 not registered. Some of these craft are of very large dimensions. They are continually passing in and out of the docks, sometimes blocking the river approach, and crowding the docks to the obstruction of the shipping. A County Council report states that 500 barges had been seen at one time in the West India Docks alone, occupying the space needed for working the ships; and bitter complaints were made when our transports were leaving for South Africa at the obstruction caused by the accumulation of barges or lighters. But, all the same, the barges are a part of the economy of the port, and its prosperity is largely due to them; so that any question of diminishing their obstruction should take the form rather of regulating than of abolishing them.

But whatever their advantage and convenience to the port, they are also without any doubt a very serious cause of expense to the dock companies, and of obstruction both within and at the river entrance of the docks. One of the first steps to be taken by the new Port Trust, if and when constituted, should be the consideration of better regulation of the barges, and especially of providing

increased facilities for them. One of the worst defects of our great barge port of London is the utter want of barge canals and barge ponds about the docks. The quays and sheds which have docks on one side should have floatage for barges on the other. To my mind this is one of the greatest defects of the port. For be it remembered that nearly 80 per cent. of all the goods that use the docks, import or export, goes away or arrives in barges, and not by road or rail. Even the railway companies send goods from their waterside depôts to the docks in barges, and fetch them from the docks in barges; while the dock companies themselves use barges to shift cargo from dock to dock. The barge problem is for London a very serious problem, and there are practically no provisions for its solution.

In short, the port needs much money to be spent on it; but the levy of dues on cargo, in the Liverpool and Glasgow fashion, would provide ample funds. And to this no doubt we shall come, Trust or no Trust. Many of the traders, however, while admitting the necessity in principle, are by no means in favour of an application which will affect their particular industry. Their attitude, in fact, is very much that of the proverbial herring-dealer, who was in favour of free trade in everything except herrings.

CHAPTER V

GRAVING DOCKS

WE have been giving a good deal of attention to the subject of docks—closed docks and tidal docks—without, so far, any recognition of another and very different, and in its place very important, kind of dock—the graving dock. Before passing to the subject of the great Manchester Canal, then, let us glance at the subject of graving docks.

A necessary adjunct to every port is ample graving dock accommodation. In old days, when ships were small, they could be grounded at high water, and examined from keel to water-line when the tide left them high and dry. Nowadays, for purpose of repair, painting, or Lloyd's Register classification survey, ships must be placed on an even keel in graving or, as it is more often called, dry dock. This is a long, narrow basin, sometimes capable of being made into two by a middle

division. The ship having been hauled in, the entrance is closed, and the water is pumped out till the dock is dry. The sloping sides are nowadays provided with stone steps, or 'altars,' from quay edge to bottom.

When the ship's keel 'takes the blocks,' as it is said, she is kept upright by props or shores which, raking or vertical, rest firmly against the steps, while these latter also serve to support the workmen's scaffolding. For small vessels 'cradles,' 'gridirons,' 'patent slips,' and 'floating docks' are occasionally used, floating docks being, however, often made to carry vessels of considerable size. Such docks are shaped like a wide capital **U**, open-ended, with hollow sides or walls. To admit a ship, these walls are filled with water till the dock sinks to a depth at which the vessel can move into it. The water is then pumped out and air admitted, when the huge structure rises till its floor is above water. These unwieldy machines are, when required, towed by slow and laborious process across the ocean to the port at which they are to be used, and where their presence is a great advantage to the port.

When a steamer breaks her shaft or loses her propeller blades on the high seas, or is hauled off a rock in need of bottom repairs, the first thing

her owners and underwriters have to consider is the nearest port at which she can be dry-docked, and in such circumstances it is common to tow a ship 1,000 miles or more to be docked and repaired. In 1902 a huge floating dock was being towed from England to Durban—a port desiring to compete with the Cape for ship repairs—when, unfortunately, it got ashore at Mossel Bay. Eventually the dock, valued at £72,000, proved a total loss, much money having in addition been expended in attempts to save it. It is understood that a new dock, double the size, to receive a vessel of about 8,000 tons, is now* being built to take its place. A floating coal depôt is about to be constructed on the principle of the floating graving dock, to carry 13,000 tons of coal, and to be equipped with the latest appliances for rapid loading. These floating structures are becoming highly important features of the world's mercantile economy, and their value and utility seem likely in the future to obtain still wider recognition.

And not merely for mercantile purposes; for our warships at certain foreign stations they are practically indispensable. Bermuda is a notable instance. The new Bermuda Dock is said to be the longest and heaviest floating graving dock yet constructed. This 'monumental edifice'—it is

* *I.e.*, August, 1903.

*now built
at Durban*

not easy to hit on a satisfactory term for it—is 545 feet long, with an inside width of 100 feet. The two side-walls, each carrying a powerful electrically worked travelling crane on what we may call the parapet, are 13 feet wide at the top. The height of the walls is 53 feet, enabling a vessel to be docked drawing 32 feet of water. The dock can take the *Campania*, and, in case of war and the commissioning of this leviathan, may have to do so. The *Campania* is, it is true, longer than the dock, but not on her keel-line, which is just the length of the dock. But with vessels now built, as they are, of steel, it is not necessary to support the whole length of the vessel in dock. It is stated, for example, that the *Empress of China*, which was placed on the floating dock at Barrow, exceeded the length of the dock by 213 feet, the excess being divided between the two ends as overhang.

The Bermuda Dock was launched in February, 1902, and towed, viâ Chatham, to Bermuda in the spring, her value being set at about £227,000, the insurance risk to cease on acceptance of the dock by the Admiralty authorities at her destination. The operation of launching was in itself no small undertaking. Somebody well said that it was 'like launching Milan Cathedral.' The guide-books refer to this wonderful edifice as a 'huge

structure, having an interior length of 486 feet and a façade width of 219 feet,' or thereabouts. But huge as the sacred structure undoubtedly is, the Bermuda Dock, so far as mere length is concerned, could put it in her capacious pocket, and the *Campania* carry it on her steel back, in each case with a great deal to spare. I am conscious that in these pages I have more than once or twice done violence to my pen in the use of adjectives expressing superlative size and power, but by the light of comparisons such as the foregoing, I think the offence is not without excuse, especially when we remember that docks, locks, and dredgers have all to be on a scale corresponding with the size of the ships.

The Bermuda floating graving dock was, after launching, towed to the Medway to be tested by a battleship. I am indebted to Messrs. Swan and Hunter, the builders, for the remarkable photograph (which is reproduced as the frontispiece to this book) of H.M.S. *Sanspareil* giving the dock a first trial.

But why 'graving dock'? In the answer we find ourselves confronted with an interesting family relationship—a blood brotherhood—between the dry-dock, the dripping-pan, and the tallow candle. In early days, as at the present time, the ship which returned from a long and tedious

voyage had to have the marine grass and weeds removed from her bottom. This was done by a process of burning or 'breaming'—a word sometimes written 'beaming,' now extinct—when the ship was left dry at low-water. No doubt some specially convenient spot or so-called dock was commonly resorted to for the purpose. When the ship had been 'breamed' she was 'graved'—i.e., smeared over with tallow. So that the spot set aside for these operations got to be known as the 'graving dock.'

The use of tallow passed away on the discovery or adoption of the cheaper and more plentiful pitch or tar, which again, in these days of steel and iron ships, has given place to anti-corrosive paints. But still, why 'graving'? Well, we must go yet further back: 'graves' or 'greaves' was the old word for the sediment or lowest quality of melted fat. We still trace the word in 'gravy.' I remember once reading, but have failed to trace the reference, that tallow 'graves' were so called from the pits or moulds into which the melted fat was run: German *graben*, to dig or excavate; and it may be—I do not know—that in the very early days, when roasting was afoot, the fat which dripped from the meat was caught in a dug-out or 'engraved' stone receptacle, and thus,

whether hot and fluid or cold and solid, took its name from the receptacle, just in the same way, for example, as we now use the word 'cast' to express either the mould itself or that which it has modelled; or the word 'boring' to describe either the hole drilled in the rock or the core drilled from it; or, indeed, just as a print or 'engraving' takes its name from the stone or plate engraved. At any rate, there are plenty of accepted etymologies as remote. But whatever the etymology of 'gravy' or of 'graves'—in its tallowy sense—this much is certain: that in old times to 'grave' a ship was to coat her bottom with tallow; and whether the modern graving dock cost £80,000 afloat or £480,000 on dry land, the humble origin of its title remains beyond question.

CHAPTER VI

THE CREATION OF THE PORT OF MANCHESTER

HAVING now passed under review the history and development of seaports, and glanced at their methods of construction and the incidents of their working, let us look at that great modern undertaking the Manchester Ship Canal. This remarkable enterprise has been termed 'the climax of a historical development.' So far back as 1720 an Act was passed to make the Mersey and Irwell navigable for barges to Manchester. In 1829 this route had become very popular for passenger traffic. In 1776 was opened the Bridgewater Canal, with further advantage to the inland town. In 1824, and at various times subsequently, proposals were put forward for further water routes, including a design to connect with the river Dee. The manufacturers had long hankered for improved water communication, and the development of the 'little trickling Clyde' into a valuable waterway, with

the splendid results to Glasgow, heightened this ambition. Newcastle, too, and Middlesbrough, had also very successfully deepened their trading rivers.

Then feeling ran high between the manufacturing district and Liverpool, which latter city was popularly believed to abuse her position by unduly taxing the goods which passed through her port. Manchester smarted under what she regarded as the artificial hindrances of her trade. Her commercial supremacy, so it was locally said, was threatened by the determining factor, cost of transit; and about 1882 an agitation arose for a ship canal which would save the manufacturing district the tolls and charges extorted by Liverpool. About that time Manchester was undergoing a period not merely of arrested development, but of actual depression. If a canal could be provided, it was urged, not only would the Liverpool tolls be kept in Manchester's pocket, but there would also be the saving of heavy railway rates of 30 miles of line.

Public meetings were held, and in the result large promises of support were obtained from various quarters, including the municipality; and it was decided to go ahead. A Bill was presented in Parliament, and during three sessions it was violently opposed by the Mersey Docks and

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Harbour Board,  Liverpool Corporation, the railway companies, and all sorts of private interests. In 1885, however, the Bill became law, and forthwith the vast undertaking was put in hand.

The difficulties to be overcome were very great. The difference in levels between Manchester and Runcorn was 60 feet, involving the construction of costly locks. Then 8 miles of cyclopean embankment were needed as a seawall on the Mersey bank. Long miles of railway embankment were required to raise the existing railway-lines to the level of the crossing bridges, high above the water. The Bridgewater Canal—an undertaking which was acquired by the company at a cost of £1,710,000—had to be carried across in a box-ended aqueduct 235 feet long, and weighing 1,450 tons, to be swung aside from a central pier at the demand of passing ships. The sewage question had to be faced, and side-locks provided for numerous subsidiary canals in connection with the Bridgewater Canal and intersecting upwards of 750 miles of country. The earth to be excavated was half the quantity taken from the Suez Canal, but about one-fifth of the Lancashire work was through sandstone rock. The length of the canal is 35 miles. The Suez Canal is 88 miles long, of which 66 miles

were excavated, 14 dredged, and 6 traced through the deeper portion of the lakes. The depth of the Suez Canal is 26 feet, that of the Manchester Canal the same. The Manchester docks are excellently equipped with transit sheds, some of them of four stories, with cranes on the roof on both fronts, the landward front of the sheds being liberally provided with railway-lines. The railway facilities are, in fact, exceptional. A grain elevator, capable of discharging 350 tons in the hour, and valuable cold-storage premises, have also been provided.

The canal was opened January 1, 1894, and whether as a coincidence or a consequence, signs of returning prosperity thereupon began to manifest themselves. The benefits of the undertaking are, of course, by no means confined to Manchester itself, no less, it is said, than 177 more or less adjacent towns being represented on the Manchester Exchange.

It may be well at this point to refer to the prospectus, issued some seventeen years ago, inviting public support of the undertaking. The share capital was to be £8,000,000, plus debentures £2,000,000; total, £10,000,000. The canal was to take four years in the making, and the cost was to be £8,408,936. It was—at any rate at the outset

—confidently advanced that, on population figures, a shipping trade of 21 million tons might be expected to pass through the canal, but 3 million tons, even, would, it was said, yield a net income of £708,000 without charging ship dues—sufficient to pay 7 per cent. on the shares and leave £69,000 in hand to place to reserves. ‘This estimate is undoubtedly a small one,’ said the sober-sanguine prospectus, while a later official memorandum reported on the project as ‘a thoroughly sound commercial undertaking,’ speedily to become remunerative on completion. But alas and alas! the four years ran to six years, while the cost proved to be grievously underestimated. For in addition to the £8,000,000 in shares and £2,000,000 debentures, some £5,600,000 had from first to last to be obtained on loan from the city treasury, a total outlay up to the present time of about £15,500,000. And the tonnage and the profits proved to be as much overestimated as the duration of the work and its cost had been underestimated. For even after eight years’ working the total tonnage, inwards and outwards, fell considerably short of 3 millions, and the net profits, instead of amounting to £708,000, came only to some £170,000. The debenture-holders have had their interest, but the Corporation is now stated

to be about £1,570,000 to the bad in respect of arrears of agreed interest on its loans, while as to the shareholders, since the canal was opened they have received not one penny, the value of their shares having meantime woefully dwindled.

In short, viewed—retrospectively and apart from future possibilities—as a financial undertaking or a direct source of profit to the investors, the Manchester Ship Canal is a colossal monument of miscalculation, and at the present time* a proposal is on foot for a financial ‘reconstruction,’ in which the fact is practically admitted. ‘The only mistake the promoters made was in not foreseeing that competition would compel the undertaking to work for about half the amount of remuneration they had calculated upon,’ said the chairman at the recent meeting of the proprietors; but this seems scarcely the whole history of the promoters’ miscalculations. For certainly they did not get, and have not yet got, anything like the share of traffic counted on. They imagined that on the opening of the canal a stream of traffic would pass along it; but it takes more than a day, or a good many days, to build up such a trading community of shipbrokers, shipowners, and shipping agents as is part of the necessary equipment of a shipping port. But no doubt if the promoters’ traffic anticipations

* *I.e.*, August, 1903.

had been fulfilled, or had seemed like fulfilment, the necessary shipping centre would not have been long in forming itself. What, however, we have to consider is not the effect or value of the canal as a present financial or interest-yielding concern, but as an industrial or trade-promoting undertaking. And so regarded, the capital expenditure must still go on; the canal, for example, must be deepened certainly 2 feet—a very costly enterprise. On the other hand, the sea-going traffic is slowly but steadily increasing, 686,000 tons (inwards and outwards) in 1894 having grown to 1,700,000 in 1897, and, it is stated, to 3,137,348 in 1902—approximately the 1901 figures of the port of Bristol.

It has already been observed that the shareholders are heavy losers. But to a probably large extent the shareholders are Lancashire people, who, it may be hoped and believed, have reaped large indirect profits from the canal. Similarly, the city ratepayers have doubtless gained much—very much—more than the 1s. or 10d. added to the rates has cost them. Without any doubt, the canal has immensely benefited the trade of the city. But for the fact, indeed, that it largely benefits the other manufacturing cities over which Manchester has no control, and that it is no part

of Manchester's business to get chestnuts out of the fire for these at the cost of her own citizens, the canal might reasonably have been made free altogether, and its whole cost raised by the city rates by gradual process, instead of partly by rates and partly by tolls on the ships and goods.

For whether a canal be in question or a road across mountains or morasses, the principle is the same—that those who want raw materials for their mills and supplies for their operatives should use their utmost efforts to draw the trade to the city, and bear the cost by *pro rata* assessment. For a municipality to provide facilities for trade is, it need hardly be observed, a very different thing from itself engaging in the trade provided.

As it is, the Corporation have largely financed the canal, and they obtain interest on their loan partly in the form of dues on the canal traffic, and partly by an addition to the rates. So far as Manchester is concerned, the ratepayers can doubtless well bear the tax, in view of the benefit to the city's trade, while as regards the other cities they are enormously benefited by having Manchester as a port. But what, after all, is the advantage to Manchester and the other cities, and how can it be assessed? We can only guess at it, but in doing so we are not altogether without data, even

though these be not definitely reducible to pounds, shillings, and pence.

At the same time there are those who claim to demonstrate, on actual figures, that Manchester's direct saving by the canal is not less than £500,000 a year, or $3\frac{1}{2}$ per cent. on the capital outlay. No doubt the construction of the canal did at the outset effect a large saving in railway rates. These were reduced both in the fear of the canal, and again largely on its actual opening to traffic. These reductions affected, of course, the neighbouring cities also, especially those having canal connections with the new waterway.

There followed a great increase in the local prosperity, and with it a corresponding and, in some cases, very great increase in the value of Corporation and other sites. New industries have sprung up, with a large increase of workmen's dwellings.

The increased prosperity of the district has also, it may be remarked, no doubt greatly benefited the railways, however the first opening of the canal may have prejudiced them. But the benefit to Manchester and her sister cities, in respect of railway rates, is by no means limited to the Liverpool traffic. The manufacturing district is catered for more or less by London also, by

Southampton, Harwich, Hull, Newcastle, and other ports, all these ports and the railways serving them being in competition for the Midland trade. When the rates from Liverpool were cut down, the railways from the other supplying ports, not to be left behind, must certainly have reduced their rates also, and the opening of the canal thus enabled Manchester to receive materials and supplies and to send away her out-turn to all the ports at a great saving in rates.

Manchester had become a port, and the transit rates between the city and the ports competing for the trade had all to come down. What this saving has meant, and means, to the whole district it is impossible to say. It must, however, be very great. And the use of the canal is increasing, as our American friends express it, 'all the time,' while every fresh advance or opening in its Continental traffic tends further to reduce the railway rates between Manchester and the ports interested in that traffic. In fact, the canal, apart from its own use as such, is a powerful engine always at work to reduce railway rates between Manchester and the various other ports, to the very great gain of the Midlands.

Then, too, industries are attracted to the banks of the canal, the canal enabling them to lower

the cost price of their goods to the extent of the railway rates which would otherwise be incurred to the port of shipment. The criterion of the industrial yield of a port is no test, no measure at all, of the commercial value of the port. At certain State-aided or rate-aided Continental ports shrewd business men—notably at Hamburg and Antwerp—laugh at the question whether the port ‘pays.’ ‘What does it matter,’ say they, ‘whether it pays or not? It brings trade to the city, trade to the whole country. Everybody benefits: the manufacturing industries, the railways, business people and tradesmen—everybody!’ And—subject, of course, to the reflection that the funds have been provided by private and not by corporate municipal enterprise—this, as it seems to me, is the point of view from which we should regard that very costly and, at first sight, not very profitable enterprise, the Manchester Ship Canal.

CHAPTER VII

RAILWAYS AND PORTS

A REVIEW of the history and present position of Manchester as a seaport affords a striking illustration of the importance of the railways to the ports. Manchester's chief port was Liverpool, and the essential connection between Liverpool as a port and Manchester as a market and export centre was the iron road. But water-carriage being practicable and cheap, and the railway rates between the two cities being, in Manchester's opinion, unduly high, the great canal was cut.

The result was, as we have remarked, to bring down not merely the railway rates complained of, but the rates of the other railways—the railways connecting Manchester with the east-coast and other ports. For, failing such competitive reductions, these ports, and the railways serving them, stood to be cut out by the attractions of Liverpool

with its competing land and water carriage systems. The importance of the railways to the ports is, indeed, so paramount that the subject calls for special consideration. And having recently written a series of articles dealing with it from its converse aspect—‘The Ports and Docks as Railway Feeders’—I will now, with the approval of the editor of the *Railway News*, repeat, with such omissions and additions as may be called for, the conclusions thus arrived at.

The degree in which the railway is responsible for the growth of the port, and the port is responsible for the development of the railway, often affords matter for interesting study. It is, in fact, a question of mixed cause and effect. So, too, when it is asked how far the port is responsible for the population, and the population for the port. The causes are mutually reacting. But while there can be a population without its port, and a port without, comparatively stated, its population, there is nowadays no such thing as a port without its railway, and, if the railway companies can help it, no railway without its port. For, while in the case of the Continental States bordering one on the other the frontier railway junction often fills the part of port, our case is different : everything that we send away, and

everything that we receive, must needs find its way to or from a shipping port. And so, too, with the millions of travellers who annually pass between the United Kingdom and other States: to all of these the port is the inevitable link between the railway and the ship. And the port itself, as, in greater or less degree, a centre of consumption and construction, is in continual need of supplies on its own account. No wonder, then, that to the railway companies a good and independent connection between their system and the shipping ports is one of the first considerations.

And if we accept it as an axiom that it is the population which makes the port, it can hardly be doubted that the railways, by bringing inland centres into connection with the ports, have been and are large contributors to the importance of the latter. The competition between the ports is, indeed, when looked at below the surface, often but another phrase for the competition of the railway companies at their back. For inland populations have all to be placed in touch with docks and quays, and the rival railway systems by which the inland cities are linked one with the other and with the various ports are unwearying in their efforts to encourage and develop the use of the

It + Relys the population

particular ports with which they themselves happen to be peculiarly connected.

If it be true that it is the population which makes the port, it is certainly also true that the population need not be at the port. The following figures, in round thousands as regards the populations, and round million pounds sterling as regards the trade (overseas traffic, 1901 returns), afford ample illustration of the fact. Thus :

POPULATION.		IMPORTS.	EXPORTS.		GRAND TOTAL.	
Thousands.	PLACE.	Million Pounds Sterling.				
		Foreign and Colonial.	British Produce.	Foreign and Colonial.	Total.	Millions.
4,545 } 6,581 }	London	170	57	35	92	262
686	Liverpool	132	90	16	106	238
242	Hull	32	15	6	21	53
764	Glasgow	14	16½	½	17	31
105	Southampton	14	11	3	14	28
10	Harwich	17	3	2	5	22
216	Newcastle	10	11	—	11	21
165	Cardiff	3½	12	—	12	15½
42	Dover	10	2	2	4	14
330	Bristol	12	1½	—	1½	13½

So that, as it will be seen, Liverpool, with a population of barely 700,000 citizens, has an import trade of no less than £132,000,000, as against London's trade of £170,000,000 for a

population (for Greater London) nearly ten times as great— $6\frac{1}{2}$ millions. Indeed, if we deduct the 'Clearing House' imports, Liverpool's figures are £116,000,000, as against London's £135,000,000, thus reducing the disparity to £19,000,000 only. Liverpool is becoming more and more the conduit-pipe for supplying with foodstuffs and with raw materials the manufacturing centres of the North and Midlands, with all their teeming millions. Here the port and the railway companies are hand in hand. It is the railways which have made Liverpool what it is. It may be replied that so also has Liverpool made the railways. But while the reply is largely true, it may be remarked that if the rails between Liverpool and the inland cities should be severed, it would not be very long before these cities would be in receipt of their supplies, even if at greater cost, by rail from other ports—Hull, Glasgow, London, and elsewhere. If the manufacturers could get on with difficulty without Liverpool as their port, without the railways they would be at a still greater disadvantage. And Liverpool, without the railways, would—if such an absurdity may be supposed—sink to the level of a petty coastal port.

It reduces itself, therefore, to this : That if it is the population which makes the port, it is the rail-

way which makes, or has made, the population. If Birmingham, for example, had to get all her raw materials and her food supplies by the slow and costly process of road-cartage, or by the still slower, if cheaper, barge, and had in like manner to send away her manufactured stuff, the city would go under. It would be killed by the competition of cities, British or foreign, more cheaply or effectively catered for by competing railways. The ports are the country's hands and mouth, the railways the arteries and veins through which its life's blood courses.

An important factor in the development, both of a seaport and of the railways behind it, is the question of market: the prosperity of a port and the nature of its use must depend largely on the contiguity of a market. A market is itself a sort of commercial middleman; goods do not pass direct from the supplier to the consumer, but to the market. From the point of view of the producers, a market is the place at which buyers congregate in competition; from the point of view of the buyers, it is the spot at which producers assemble and compete to dispose of their goods; so that while, for example, goods are landed at Southampton, and are wanted at Southampton and in the adjacent cities, it is not at South-

ampton that they are offered for sale; there is no market at Southampton. The goods mainly go through to London, where they are sure of a good market. And buyers from or on behalf of Southampton and the neighbouring populations make their purchases on the market in London because there they have a greater choice, and the competition amongst the sellers is keenest.

When, therefore, we hear talk of the decadence of London as a port, and of how the superior attractions or facilities of this or that other port are going to kill or prejudice it, we in London need not be unduly alarmed. Goods will, by water or by rail, be conveyed to London in any case, because it is a market—the biggest market the world has ever known. And in commercial matters it is much more difficult to create a market than to make a dock, or even a port. The new port may, it is true, be largely used, but unless and until it shall become a market, it will be used only as a conduit-pipe. Trade runs in grooves, and when once the groove has become well marked it becomes a matter of the greatest difficulty to disturb the customary use.

Tea—‘the drug tea’—is a notable, if extreme, illustration in point. In 1901 the British Isles imported 295,264,142 pounds of tea. One would have

thought that with tea the national beverage, having, of course, an enormous consumption in the Midlands and the North, and with a steady stream of big steamers trading between the tea ports and Liverpool, a large proportion of the national supplies would have gone direct to Liverpool. But what do we find? Out of this 295,264,142 pounds no less than 293,632,574—99½ per cent.—came to London. And of any tea landed at Liverpool the Blue-Books make no mention at all. Every town and city in the British Isles must get its tea from London. The first importation of the cheering beverage came, no doubt, to London, and gave birth to ‘the tea trade,’ an army of expert tasters, mixers, buyers, brokers, and sellers. And the advantage of saving a little in railway-carriage by obtaining the tea at a port nearer to this or that city is completely outweighed by the advantage of buying in London’s more distant market through a skilled individual educated to the business. Tea is, no doubt, an extreme case, but it illustrates well the general principle that trade will flow to its customary market just as water flows down hill.

The importance of good railway communication to the success of a port can hardly be overestimated. But so far as at any rate imports are

concerned, no facilities of railway communication will of themselves create a trading port. If the port will develop itself and keep itself fully up to date, it can be pretty sure that it will not be left in want of railway conduits to its inland markets or centres of consumption. At the same time, the fact must be recognised that if existing railway conduits could now be created afresh—could now be created so as to provide for every port the facilities of which it is in need, the present accommodation would in many cases be on a much more liberal scale. For the railway companies are now all more or less suffering, and in some instances suffering severely, for their early and inevitable mistake of construction on too limited a plan, a mistake now most difficult to rectify. Still, it is the railways which wait on and for the port, and sooner or later port development will be followed and supported by the increased railway facilities without which such development cannot proceed.

And probably in most cases it will be found that the port which seeks to make the railways responsible for the retardation of its growth is but casting around for a scapegoat for its own want of enterprise.

Bristol, in spite of her one-time greatness and her splendid position, both as regards the ocean

highways and the populations at her back, has been content to see her trade slip from her. In our national port-list she has fallen to a place which is equally far removed from her former standing, and from the position which, had she shown due enterprise and foresight, she might now be occupying. To reply that her river has been outgrown by modern shipping is to confess that she has been wanting in the zeal and public spirit which has enabled Glasgow to turn 'the little trickling Clyde' into a magnificent—though still confessedly imperfect—waterway for the biggest ships. The result is that to-day, while Glasgow imports foreign produce to the extent of £14,000,000, and sends away home produce to the value of £16,500,000, having a total trade of £31,000,000, Bristol is content—or, rather, has now come to expressing her great dissatisfaction—with a total trade of £13,500,000, of which £12,000,000 are imports, mainly foodstuffs, and only £1,500,000 exports. The Avon citizens complain that serious delays are experienced in getting railway clearance for the big ships which come to the Avonmouth Dock. Doubtless there are delays so caused; Bristol would be an exception to most other ports if it were not so. And, no doubt, increased railway facilities would, in fact, be an

advantage to the port as such. There is nothing like an alternative and competing route for bringing down railway charges, and to reduce the rate of transit to and from a port is to strengthen such port in competition with its rivals. Of course, the rival railway carriers may 'stand in' together, but probably not until a war of rates, of the greatest benefit to the port, shall have forced this upon them.

A port can hardly be at its best until the railways contend for its trade; and when the railways have not only to compete with one another, but also to face the competition of canals, great should be the prosperity of the port.

And great accordingly do we find the prosperity of Hull, where the North-Eastern and the Hull and Barnsley are in active (if the word 'fierce' be too strong) competition, while the enterprising inland navigators, with their network of canals, are a constant menace to them both. But while much of the traffic carried on by the canals could no doubt be satisfactorily dealt with by the railways, a still greater part of the railways' traffic could certainly not be handled by the canals. Whenever, owing to the perishable nature of the commodities or to the pressing needs of the consumers, rapidity of delivery is essential or impor-

tant, the iron road is indispensable. But while, doubtless, the Humber railways look with anything but the eye of affection on the water-carriers, and these latter are willing to go without the railway companies' regard if only they can get their goods, it is much to be doubted whether on the whole, so far as the Humber district is concerned, the railways do not benefit by the canals, and the canals derive support from the railways. It is their joint operation which has made Hull what it is, and no doubt this joint operation reacts in a manner beneficial to both. That it is beneficial—remarkably beneficial—to Hull and the other cities within the supply radius needs no demonstration.

Let it be repeated that if the ports are the country's hands and mouth, the railways are certainly the arteries and veins through which its life-blood flows. Every time a port, whether on sufficient grounds or otherwise, complains of its railway service, the complaint is an admission of our axiom's truth. But a port needs something more than railway service; as already conveyed, it needs, to enable it to contend advantageously with its rivals, railway competition. And be the single local service as liberal as it may, it will never be at its best or cheapest until under the

stress of competition. For after all a port is, in most cases, and always more or less, but a road to a market; and freights and port charges being equal, trade will select the line of least resistance under the head of inland carriage.

It follows, therefore, that in the national interest the fullest encouragement should be given to railway development in connection with our ports. And equally so, or even still more so, when the question is not of extending existing railway facilities, but of creating a new railway port or railway dock. We remarked at the opening of these reflections how ports differ amongst themselves in their use or scope, one being a barge port, another a railway port, another a combination of the two, and so forth. But ports differ in another essential point—in the point of their ownership—and this means, or may mean, much. The docks, for example, may be a share-company, as at present in London, where the object is not merely to pay working expenses and to provide for needful developments, but, over and above all this, to earn a trading profit. Or they may be run—as in Liverpool and Glasgow—practically by a public trust, aiming solely at the collection of such tolls and dues as may suffice to support the port and docks and their development. Or they may be of rail-

way ownership, used and intended primarily as railway feeders. As such they stand much on the footing of Hamburg and Antwerp, our great rivals, which are run by the State or by the municipality, singly or jointly, possibly, or even probably, at a loss. 'What does it matter,' say the citizens of these great and increasing Continental ports—'what does it matter whether we make a profit on the docks or not? Docks are not of themselves machines of trade; they are to bring trade to the country. And when we have got the trade here we know what to do with it. We make our profit on the trade, not on the docks.'

It is exceedingly difficult for us in England to compete with ports designed and worked on a plan of such wise and magnificent liberality. Dock companies have to earn a trading profit; a public trust must levy rates which at least will not leave a loss. In the railway dock, however, we realize the Continental plan. 'What does it matter,' say the railway proprietors—'what does it matter whether we make a profit on our dock or not? The port and dock are there to be a railway feeder. They bring traffic to our metals, loads to our rolling stock. We can afford not to make anything, or even to lose, on our dock, because of

what it brings to our railway system. The port is thus made attractive to the shipping trade ; and all the better for the country.' No doubt, all the better for the country. And, indeed, from first to last the well-being of our ports is bound up in their railway service ; and in the interests of our national trade the fact cannot, more especially in any scheme of port development or port improvement, be too clearly recognized.

The well-being of our ports is bound up in their railway service. This is true, but by no means all the truth ; and of this the cases of Manchester and Hull are illustrations clear enough. Inland navigation, which at one time played so important a part in our commercial development, is still here and there an active and highly beneficial power in port development. And as it seems by no means improbable that the great possibilities of canals and barges may presently receive greater attention, it may be well to conclude with a brief consideration of the subject.

CHAPTER VIII

CANALS AND PORTS

WE have just been considering, in port development, the enormous importance of the railway companies. In the national economy a port is, of course, not to be viewed as a separate entity, but as a point of traffic junction, a point of divergence and convergence where sea-carriage and land-carriage join hands—a cargo conduit-pipe, in fact. And the pipe must be kept fully open, both for the arrival and departure of sea-borne goods on the sea side, and for the clearance or despatch and reception of goods land-carried. The quays, docks, and river must be always clear and unimpeded on the one side, the roads and railway-lines on the other.

But of late years we have entered on new and unforeseen conditions, and these conditions are becoming more and more important and accentuated.

I refer to the huge—nay, the stupendous—bulk of cargo which a single ship can bring. The subject has already been referred to on p. 109. We know that 1,000 tons of cargo equals 125 railway-truck loads, or about five goods-train loads; and, while from 10,000 to 20,000 tons of cargo can be put out of a single vessel, three or four vessels, each carrying from 5,000 to 10,000 tons, may easily arrive together. It is not, indeed, merely that this or that vessel is specially big, but that tonnage generally is on a scale of steady increase. The figures on p. 66 are evidence of the fact.

The difficulty of the day is to give shore clearance to the cargoes that are shot pell-mell into our ports; for our roads and our railways have nothing like kept pace in their development with the ever-increasing capacity of the ships. I have a strong belief that in London, at any rate, the roads to the docks need great improvement. On this point the Royal Commissioners took little or no evidence, and their report makes practically no reference to it. The railway problem they also left practically untouched.

They kept, in fact, to the defects of the port as such: to the river, the docks, and the quays and sheds, and behind these latter they did not go. And, indeed, within the limitations of their refer-

ence there was work for them enough and to spare. But what we may call the inland clearance question is a problem of great and increasing importance certainly for London, and more or less for other ports. We read of lines blocked and of deficiency of trucks in England and Scotland, in America and France; of ships detained because they cannot get their cargoes carried away; and of quays blocked with goods awaiting removal. Also of the difficulty of 'bunkering' steamships for want of railway access to the docks.

In America they are building bigger trucks and more powerful engines. We read of trucks to carry 40 or 50 tons instead of 8 or 10 tons, and giant engines upstanding to a height of 14 feet, or even 16 feet. But all this is in a distracted attempt to come level to the needs only as they are, while all the time these needs themselves are growing.

Goods and produce are, in fact, more and more frequently poured into the land-transit ports beyond the capacity of the railways to remove them. The condition is not yet chronic, but in trade, as in other matters, the pendulum swings between ease and pressure, between fast and feast, and the dock authorities know it well. And in the times of

pressure the railways are overtaken by the calls upon their rolling stock and sidings. It will probably be no great while before the possibilities of inland water conveyance again force themselves on the public attention.

In Germany, in Holland, and in Belgium the use and value of such conveyance receive the fullest encouragement and recognition. In France, where very large sums have been spent on the rivers and canals, further very large outlays are in contemplation. The great prosperity of Hull, where about four-fifths of the importations leave the North-Eastern Railway Company's docks in keels or barges, is largely due to the water-roads, both local and to the Northern and Midland towns. In an interesting and instructive article on 'The Internal Navigation of France,' by M. Pierre Baudin, ex-Minister of Public Works, in the *Contemporary Review* for last June, occurs the following passage: 'Since the tonnage of ships at Marseilles has only increased by 121 per cent. between 1870 and 1899, and at Bordeaux similar progress has only been made at the rate of 89 per cent., whilst at Rotterdam it was 526 per cent., at Hamburg 445 per cent., at Antwerp 400 per cent. during the same period, the fact of the inferiority of the French ports must be attributed

to their not having the support, like their rivals, of a system of waterways radiating from the coasts into the interior.'

The well-informed writer points out how in Germany, etc., not merely rough and low-valued stuff—in England, ordinarily, lime and bricks and city refuse—but raw materials for the manufactories, and finished goods from these back to the shipping ports, form a highly important part of the water traffic. The railways and the waterways being largely the property of the State, the two methods of transit work hand in hand, greatly to the national advantage. A good understanding between the railways and the waterways is of course indispensable, and in this respect we in England are under a great disadvantage.

The French writer insists on the necessity for frequent points of contact between the two systems. Such connections are, he points out, with comments unfavourable to his own country, one in sixty-six miles on the Rhone, one in eighty miles on the Garonne, and one in 114 miles on the Saône, and in other cases no connection at all. 'In Germany, on the contrary, there are points of contact on the great rivers at distances of twenty-three miles.' The construction of canals is, no doubt, an expensive business, but so far as

the cost of conveyance is concerned, water-carriage is out and away the cheapest form of traffic.

And all raw material is not always wanted in a hurry, as anyone may see who watches the barge trade of the Humber and its water connections. Wool, too, which is railed to Bradford from the London docks or carried round to Goole by sea is often left for many weeks in the railway sheds. Manufacturers make their purchases in Australia, and on arrival of the shipments they have often no storage for them of their own while the machines are being fed with stocks on hand.

But our canals and riverways, the highly prosperous routes of former days, overlain and smothered by the railways, want new life breathed into them to make them once more a first-class national asset, to restore them to their original position as a highly valuable part of our machinery of trade and manufacture.

When the canals were first made by the various companies which promoted them every company had more or less its own idea of system, economy, and fitness, and the varieties of gauge, the differences of depth and of régime which resulted have always presented a serious obstacle to the working of the system as a whole.

A big barge arrives at a canal junction where

her cargo has to be taken out and put into a smaller craft simply because she cannot get into the lock, and transhipments of barge-cargoes are like transhipments of ship-cargoes: they mean delay, perhaps rough usage, and certainly the cost of double handling.

Still, there the canals are, needing only the reconstruction of the locks and perhaps the strong and friendly arm of the modern dredger to turn them into gold.

But of course all this would mean money—much money—and the canal properties, most of them, are not so flourishing as to justify a certain large expenditure of which, with railway competition always to face, the result cannot be regarded as a prompt or certain profit. Still, the waterways are there.

It is, of course, the railway opposition which is the trouble. As matters stand, the railways have got possession, here and there, of canal links, and they sit tight on them. The barge that wants to pass through the railway link of the system has to pay a heavy toll for the privilege. No doubt the Acts establish maximum tolls and the railways have to keep within them; but these tolls are more or less obsolete, and the canal companies, for their own part of the system, work

considerably under them. Possibly an enactment compelling the railway tolls for railway sections to be brought down to the average of the tolls on the private systems connecting with them might have a good effect, but sooner or later something will have to be done to prevent such piecemeal throttling of the national inland waterways as a whole.

Then, again, when the railway companies have not got possession of a coveted link, they have managed to acquire or supersede the inland feeders, and doubtless succeed in working these rather as a means of feeding the railways from the canals than of delivery to the canals from the railways. At any rate, if most of us were railway people this is the policy we should perhaps aim at in our own immediate interests.

The question of the inland waterways badly wants taking up; but the canal companies themselves are quite unable to contend, with any prospect of success, against the immense power of the railways, and unless and until the traders organize themselves and identify their interests with those of the enfeebled water-carriers the latter seem likely to be left in the regrettable predicament in which railway competition has placed them.

But over and above the railway hostility the

canal carriers are the victims of obsolete methods of traction. In these days of steam development, of oil-motors and electric haulage, canal companies which rely mainly on the patient horse for their motive power stand self-condemned.

The goods which find their way from the London docks to the Regent's Canal or to Brentford are mostly carried in Thames lighters which tranship into canal barges or the well-known 'monkey-boats' of about 25 tons—length without capacity. For 'the pool' below London Bridge is no place for country barges with women on board, and when we do see them in the tidal stream they are generally, like the policemen in dangerous localities, linked in couples.

But they are always interesting—a picturesque spectacle. On the rare occasions when they brave the perils of the tidal deep they sally forth, hauled by a panting little tug, six of them in a tow, attached side by side in couples, close together like Philippines. The ship's company consists of the officers (the helmsman's husband) at the blunt-nosed bow, the crew (his wife) at the distant helm, hard by the gaily-painted cabin with its little smoking chimney. With one brown arm lazily on the tiller, the lady talks from beneath her linen hood to her water-babies on the com-

panion-way; while the brown dog, as supercargo, possessed with a breathless sense of his duty to be at both ends of the ship at once, races frantically to and fro along the gunwale.

It is a new and trying experience to the brown dog to be clean out of sight of land in its familiar form of towpath backed with buttercups; to say nothing of the trial of faith involved by a motive power in which neither whip nor nosebag play a part; and no doubt the whole ship's company, including the perplexed supercargo, are glad when the panting tug tows them back, still in Philippines, to their canal port, at which commences their lazy voyage to their distant inland town.

The Humber barges or 'keels,' are broad and bluff, making up for any want of length by breadth of beam. They are, in fact, quaintly carved and painted first-cousins of the Medway barge. They can afford to be broad, because the system of the Aire and Calder Navigation is, I believe, unencumbered with locks. At any rate, any locks there may be in that part of the world, judging from the beam of the keels, must be of ample width.

But, monkey-boats or keels, what does it matter? By the side of a German barge, of its 500 tons or 1,000 tons, or even more, they are children's toys.

The big, flat-bottomed German could just as well carry a load of monkey-boats or keels, cargoes and all, as not. The tug, too, he could take on board, and drop the whole lot overside wherever they might want to begin their sleepy voyage in tow of the often-awakened horse.

The German barges are a revelation in the possibilities of inland navigation. Of great length and beam and depth of hold, and bluff at the bow and stern, they need a rudder which, if it would not exactly cut up into a pair of monkey-boats, might certainly be an awkward cargo for a single barge to stow.

These mammoth German and Low Country boats, under their own steam or in tow, big as they are—a string of them, perhaps, behind a single powerful tug—travel great distances inland. As in the case of the ships, the bigger the vessel the lower the cost of conveyance; while for bringing to the ports and building-yards the huge frames and girders and rudder-posts used in the building and repairing of modern ships, they serve an invaluable part. ‘It is natural,’ says Adam Smith, writing a century and a quarter ago—‘it is natural that the first improvements of art and industry should be made where this conveniency opens the whole world for a market in the produce of every

sort of labour.' 'This conveniency' was, of course, water - carriage; and though railway-carriage has since stepped in, water-carriage, especially with modern means of haulage or propulsion, is still far and away the cheapest possible. The Manchester Corporation is never tired of congratulating the city on the industrial undertakings which the great Ship Canal has attracted, and will yet attract, to its banks.

Cheap carriage of raw material to the works, and cheap conveyance of their products to the sea are, in the support of trade, two mighty forces. No wonder Hamburg and Antwerp are prospering. M. Pierre Baudin is probably not wide of the truth in his reflections on the national advantages of inland waterways.

CHAPTER IX

CONCLUDING REFLECTIONS

FROM earliest history the predominating idea of every State—an idea sometimes practicable, sometimes impossible of realization—has been the idea, the motive power, of territorial aggrandizement. It is a force still active; but side by side with it, and in the case of the most civilized States already predominating it, is the conviction that an increase of trade is more to be desired even than an extension of territory, or, at all events, that if new territory is a desideratum, it is so rather as affording scope for new trade than on its own account. The struggle between nation and nation is now, and with the growth of civilization seems destined increasingly to become, a contest for the possession or extension of trade. The former things have passed or are passing away, and the nations are entering on a new epoch in the world's history. And the struggle is one both

of offence and of defence. Of offence, because every State seeks, by every means in its power, to obtain the mastery or the advantage in its trade competition with rival States, even to the extent of beating the rival on its own ground, whilst the national manufacturers or producers, as individuals, strenuously second or incite such efforts of the Government. Of defence, because every State—England since the days of free trade excepted—strives by protective duties to exclude from its own territories trade aiming at or likely to result in the hamstringing or annihilation of the national industries. It is a rivalry no longer confined to the armies of the combatants, but is a ceaseless struggle between the individual industries, producers and merchants on the one side, and the individual industries, producers and merchants on the other, in each case more or less actively or openly backed by the power and diplomacy of the State. For States have come to recognise that while their fighting strength is in the national armed forces, whether at sea or on land, the due maintenance, if not, indeed, the very existence, of these must in the end depend largely on the prosperity of the nation's trade. For every industry contributes its quota to the coffers of the State, and the greater the prosperity of this or that industry the

greater its subsidy to the nation's chest. The case, no doubt, was always so ; but whereas in other days—the days of comparatively small things—the producer or the manufacturer aimed at, and was in the main content with, the successful supply of the home market, the extraordinary development of modern trade and commerce have inspired or driven him to search out markets far afield, with the result of vast additions to the national wealth. The conditions are changed, and great as has been the change already produced, the conclusion seems inevitable that with the immense developments yet to be effected by the iron road, changes as great or even greater are in store for us.

Ports are but adjuncts to the railways, and nowadays trade is dependent on the railways. The history of England's modern prosperity and that of her ports is the history of her railways. She was first in the field with steam and its various industrial uses, first in the field with her railways. The two giants joined hands, and, aided by the nation's shipping, England's trade became such as the world had never seen even in a dream. But without the railways our trade would have been choked and smothered under the expense of inland transport. It may, indeed, easily cost more to

carry a shipment of goods from their port of discharge to their inland destination, though the distance be only short, than to bring them from the other side of the world. We hear, for example, stories, whether true or not, of goods being sent from an English port to New York, thence to be returned to another English port, as being on the whole the cheapest means of bringing them to their English destination. At the outset we did great things for our trade by the construction of splendid highways. Then, inspired, perhaps, by the example and experiences of wealthy Holland, we set to work upon a network of canals. By these means we did much to cheapen conveyance between our manufacturers and the seaports; but not until the introduction of the iron road did we enter on the full tide of our prosperity. The partial (and still inadequate) adoption of the wonderful new method of transport found favour also in our Indian possessions. The practically impassable gulf between the inland producers and the shipping port was bridged over, and the raw material and the foodstuffs of the Indies were thereupon and thenceforth poured, practically without a stop, from India's distant fields and inland gardens into our manufacturing cities. These grew apace. Population and wealth in-

creased. Our exports of foodstuffs, long conducted simultaneously with their import—sometimes the one, sometimes the other showing an excess—began about a century ago to take the second place. A generation later—two generations ago—wheat and flour from beyond the seas began to flow into England in a fairly steady and gradually increasing stream. The railway was being pushed further and further into the hinterlands of the United States, prairie lands turning into fields of waving corn at the touch of the magic wand of the railway engineer. The land, no doubt, would always have grown corn, but who would plough and sow and reap, however fertile the soil, when the cost of getting the crops to the coast would exceed their value when delivered there? But brought by rail to the ships at small cost, carried across the seas at small cost, and delivered by rail to the consumers, once more at small cost, foreign corn became in time so cheap in England that our farmers, handicapped by high rents for their land, found themselves face to face with starvation. By a gradual process of rent-abatement their misfortune has been transferred to, or rather shared by, the owners of the land, but without any prospect of relief to either. And why, indeed, or whence should relief be looked for? India and

the wide Argentine, the United States and Canada, South Africa and Siberia, all more or less wheat-producing countries, are all of them also far, still very far, from the full production which will develop as the railway track extends into their new areas of supply. And as these new sources are tapped, the supplies of corn must needs increase for the old world. Competition between the producers will result in economies between the plough and the reaper, between the reaper and the train. Competition between the railway companies, and the cry for dividends, will effect cheaper railway transit ; already we read of bigger trucks, of more powerful haulage, and of longer trains. Competition between rival ports of shipment will create increased facilities of loading, resulting in the saving of time and of handling charges, in the advantage of increased wharfage, and in accommodation for ships of great capacity. The sources of the supply of corn must needs increase, and the lower prices resulting from competition between the producers will have a counterpart in diminished cost of conveyance from producer to consumer.

Everything points to the conclusion that corn and flour will in the future pour into England in greater and greater quantities, and in the long

run at a lower and lower price. New and increasing sources of supply; economies all along the line between these and the carrying ships; lower and lower freights consequent on the greater capacity of ships specially constructed for such trade, and on the competition between their owners; reduced port charges at destination and greater economy of transport by railway or canal to the inland centres of consumption—all these will co-operate in the same direction, the direction of greater cheapness.

But the long trains of railway-trucks from the new fields of production to the seaports will not return empty. The owners of the wide lands and their labouring hosts, and the new towns and cities round which this husbandry will centre, will look to the consumers of their produce for an exchange of trade. The trucks which bring down to the ships wheat and flour and produce of all sorts will be loaded for the return journey with the products of the factory and the mill. The scope and opportunities for trade for all the nations will increase indefinitely. The producers, in various parts of the world, of corn and raw material will compete keenly for the supply of the world's industrial centres; the manufacturers and the industries, whether as States or as individuals, will

compete no less keenly for the custom of the distant agricultural areas. Trade will be paid for by trade. And while cheapness in production, whether in the case of farmer or of manufacturer, of sheep-grower or of sugar-refiner, counts for much, it is only one of the weapons of the peaceful war. It is in vain that the producer produces more cheaply than his competitor if the costs and process of carriage and of handling are such that his produce is delivered more dearly or less promptly at its distant market; and in commerce time is money. To the shipowner they are known conjointly as Despatch. Economy and Despatch, these are the allies of the successful trader. To deprive him of them is probably to destroy, certainly to gravely prejudice, his chances of successful enterprise. In the matter of ocean transport we can trust our shipowners, equipped as they are with experience and enterprise, and stimulated as they are by the spur of competition, to support our traders to the utmost. But ocean transport is not everything.

So far as England is concerned, it is in our ports, in our shore clearance at the ports, and in means of inland transport, that we are inadequately equipped—inadequately equipped for the struggle as it now exists, still less

adequately equipped for the endless and more active campaign of the future.

Who, reading the evidence given before the Royal Commission on the Port of London, can say that the Port of London is what it should be? A river clamouring to be made deep enough for the mighty ships which come to it, and which, we may hope, will come to it in yet greater number and yet mightier. The dock quays crying out to be enlarged and provided with adequate shed-room. The trade of the port mainly carried on—and well carried on—by barges, and little or no accommodation or provision for this special trade; the barges waiting to be loaded at the quays piled up with goods, and unable to come at them because of the ships discharging there. The owners of the ships clamouring for prompt despatch, and wrathful at having to pay out of their own pockets charges for sorting and delivery borne in Liverpool by the consignees, but which in London ancient custom charges to indignant carriers. The railways, whose iron fingers should reach around the up-river docks, and the palm of whose smoke-grimed hand should provide an ample shunting ground and sidings for every dock, unduly driven to the use of barges to supplement connection with their rolling-stock. Who

can say that the Port of London is what it should be? If Tilbury dock and the docks of prosperous Hull are not wastefully supplied with rails, then surely some of the London docks are lamentably behind the needs. And if Antwerp and Hull and the great Rhine and Elbe and Weser ports carry prosperity to their objective cities by—at least in the case of the foreign ports—giant barges on well-equipped canals, how do we justify to ourselves the neglect and disuse of our costly inland waterways?

The times have changed, and we have not sufficiently changed with them. The Port of London possesses, no doubt, great natural advantages and many excellent features; and there is, in fact, no port which is not now suffering under drawbacks or disadvantages of some or several sorts. And in the above remarks there is no intention to belittle or decry the advantages of London, and certainly no desire to suggest blame on any for its shortcomings. But the times have changed, and be the cause or explanation what it may, we have not sufficiently changed with them. If the system and adjuncts of the port were to be reconstructed to suit the conditions of to-day; and, still more, if they were to be reconstructed to meet the conditions of what will be the great

trade rivalry of the future; we should look back with something like amazement at the port facilities which at present have to serve the purpose. Vast sums of money will need to be spent to make London the port which it should be, and which, if our ancient city is to maintain and improve its position, it must be,—vast sums of money and many years of time. But London is in no want of money, and in any case money we must spend. And as to time, have we not all there is? Time, that is to say, in which to push to a satisfactory conclusion the work which needs to be undertaken, but no time for delay in its commencement. The work should certainly be put in hand with the least possible delay. That it will be so the legislative proposals before the nation give us at any rate grounds to hope.

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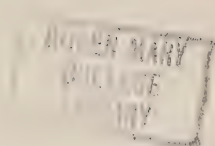
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